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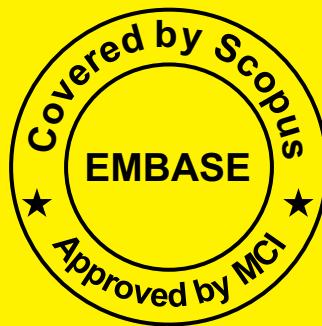
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# A Study of Financial Counselling and Estimation of Variance between Estimated Bill and Actual Bill of Cardiac Cath Lab

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## ABSTRACT

Cardiac cath lab is one of the major revenue generating department of the hospital, so it must be managed properly.

The present study is retrospective and data collection was done for 3 months. The study was analyzed using DMAIC methodology. Fish bone diagram and Gap analysis. Number of factors contribute to variances in estimated bill

- Preexisting conditions
- No of stents
- Surgeons charges
- Room charges
- ALOS

The variance calculated is 85% of actual bills are above estimated bills and 14 % are below estimated bills. Only 1% of actual and estimated bills are equivalent. It was recommended to control the variations by applying six sigma tools and following SOPs.

**Keywords:** Cardiac cath lab, Fishbone analysis, financial counselling,

## INTRODUCTION

Cardiac catheterization is a non-surgical procedure often recommended for patients who suffer from chest pain, show signs of blocked arteries or have atypical stress test results. It enables doctors to more precisely pinpoint potential heart problems such as coronary artery, aortic or valve disease and provides critical answers needed to determine the best course of action and establish a treatment plan.

The staff in the cardiac cath lab can play a major role in achieving—or hindering the ability to achieve—the highest possible reimbursement for their hospital. Members of the cath lab team will need to heavily focus on improving quality, patient satisfaction, and outcomes. The combination of cost control and achievement of positive care and patient satisfaction measures can have a lasting impact on the financial performance. Constant, concentrated effort on patient-centered care by way of quality and satisfaction enhancement can have

downstream effects that will put your hospital in great position to be a provider of choice, and can help prepare for any other future programs. The cath lab can be the leading agent for hospital change by providing significant contributions. This study reviews the techniques used for financial analysis of billing in cath lab. Since cath lab is among the highest revenue generators for the hospital, it is necessary to be financial solvent.

**Aim of the study:** To calculate the variance between estimated bill and actual bill

### Objectives of the study

1. Accuracy of estimation of billing
2. Transparency of cost in the billing procedure
3. Gap Analysis

## REVIEW OF LITERATURE

Healthcare delivery costs continue to rise due to increased demand for patient services. Various hospital

departments, such as the emergency department (ED), radiology department, Cardiac cath lab and pharmacy represent a small sample of such departments facing high patient demand. On the other hand, there exist tremendous opportunities for cost reduction and quality improvement in the operation of these departments.<sup>1</sup>

A team that cannot communicate effectively can compromise patient flow, procedure scheduling and patient outcomes, and negatively impact the program as a whole by fostering low morale, high turnover and so on, which can have a huge financial impact on the organization's bottom line. Overcoming communication challenges will allow for easier and more effective relationships to be established.<sup>2</sup>

Cost finding and cost analysis are the technique of allocating direct and indirect cost. They are also the process of manipulating or rearranging the data or information in existing accounts in order to obtain the costs of services rendered by the hospital. As financial management techniques, cost finding and analysis help to furnish the necessary data for making more informed decisions concerning operations and infrastructure investments. If structured accurately, cost data can provide information on operational performance by cost center. This information can be compared to budgeted performance expectations in order to identify problem areas that require immediate attention. These data give management the material to evaluate and modify operations if necessary. Moreover, knowledge of costs (both unit and total) can assist in planning for future budgets (as an indicator of efficiency) and to establish a schedule of charges for patient services. A hospital cannot set rates and charges which are realistically related to costs unless the cost finding system accurately allocates both direct and indirect costs to the appropriate cost center. Finally, cost finding and analysis are also of value to management in ensuring that costs do not exceed available revenues and subsidies.<sup>3</sup>

Two fundamental items of financial data needed by a hospital manager are allocated costs by cost center and the unit cost of hospital services. A unit of hospital services may be as small as one meal, or as broad as an entire inpatient stay. To perform these calculations precisely, the hospital needs an accurate and comprehensive financial accounting system. In many hospitals, however, existing accounting systems have gaps, such as excluding some costs or lacking the data

to relate the costs to specific cost centers. In these cases, estimates are needed. It is organized based on seven steps for computing unit costs.

The steps are:

1. Define the final product.
2. Define cost centers.
3. Identify the full cost for each input.
4. Assign inputs to cost centers.
5. Allocate all costs to final cost centers.
6. Compute total and unit cost for each final cost center.
7. Report results.<sup>4</sup>

### **3.1 Define the Final Product of the Cost Analysis:**

What are the services or departments for which you are interested in computing unit costs? For example, do you want to know the unit cost for all inpatient services, or a separate unit cost figure for each ward or service? The decision will depend on two key questions:

**Purpose of the Analysis:** To do a comparison of costs of certain hospital departments by computing costs department wise & then predict the variation between projected cost & actual cost incurred by the patient

**Type of Data Available:** Our ability to compute unit costs will be constrained by how aggregate or disaggregate the available data are for both costs and utilization. For example, in order to compute unit costs by ward, you would need to have at minimum utilization data by ward (e.g actual total patient days for each ward for a particular budget year).

In some cases, it may be unclear whether to compute a separate unit cost for a certain activity, or allocate its costs to some other output. For example, some studies have computed separate unit costs for lab and radiology departments, thereby excluding those costs from the cost per inpatient day or discharge. Others have treated lab and radiology as intermediate outputs, and fully allocated their costs to the inpatient cost centers. Again, the desirability of each approach depends on the purpose of the analysis, but it is important to be consistent.

**Define Cost Centers:** The next step for computing unit costs is to determine the centers of activity in the hospital to which direct and/or indirect costs will be assigned. The

major direct cost categories of most departments include salaries, supplies, and other (purchased services such as dues, travel, and rents). Indirect cost categories include depreciation and allocated costs of other departments.

The rationale for choosing centers of activity that correspond with the hospital's organizational and/or accounting structure is managerial. Hospitals are organized into departments and, since we want to strengthen the management of these departments, it is useful to have cost centers that correspond to the existing organizational structure of the hospital. This provides: (1) the road map by which costs can be routed, through the process of cost finding, to final cost centers; and (2) a framework for costing the distinct functions of each center. Following this road map shows individual managers how they are using available resources in relation to what has been budgeted and the services that they are providing.

From an administrative standpoint, cost centers can be distinguished based on the nature of their work--patient care, intermediate clinical care and overhead centers. As explained below, some costs centers represent patient-centered activities (i.e., final or intermediate cost centers), while others are primarily for general services (i.e., overhead cost centers) such as housekeeping, laundry, maintenance, and the many other tasks necessary for the satisfactory operation of a complex organization like a hospital.

**Identify the Full Cost for Each Input:** An important part of computing unit costs is to make sure that you have cost data which are as complete as possible. Two issues are involved: (1) the conceptual issue of determining which expenditures should be counted as costs based on an economic sense of resources used up during production of health care, and (2) the actual measurement of true costs using available data (which may be incomplete or untrustworthy). Various studies have developed ways to impute or approximate cost when existing data are problematic.

**Assignment of Inputs to Cost Centers:** At this point, you have presumably gathered information about the hospital's total costs, whatever the source of payment. This information alone may provide useful insights even before you start computing unit costs: for example, in identifying which line items account for most of cost and whether this is changing over time. However, to compute

unit costs one must proceed to the next step: assigning costs from each line item to the relevant cost centers.

#### Allocation of All Costs to Final Cost Centers

The next step is to reallocate all indirect costs to the final cost centers. In this way, the unit cost will include overhead costs incurred in producing an admission, day or visit, not just direct costs. Indirect costs will include all costs which could not be allocated directly to final cost centers at an earlier stage. In some hospitals, this will only comprise services such as administration and laundry. In others, intermediate services such as pharmacy and radiology may also need allocating at this point, with little or no information about how much of their workload was generated by each of the medical departments.<sup>5</sup>

**Computing Unit Cost for Each Cost Center:** At this point you know the total costs that were incurred at each of the final cost centers. What is the output of each center, in days, discharges, lab tests etc.? This requires incorporating utilization data into the analysis.

In reality, you will have used the utilization data already by this point, for example in order to allocate laundry costs across wards in proportion to bed-days. However, this is the point at which any problems with the utilization data become particularly important, because they directly alter the unit costs.<sup>6</sup>

Several studies encountered problems with utilization data. In some cases, the number of admissions seemed accurate, but admission and discharge dates had not been carefully recorded, causing measurement of bed-days to be inaccurate. Correct measurement of bed-days requires that staff count how many beds are occupied in every ward, every 24 hours at the same time of day. Once you have obtained the utilization data, the unit cost can be computed.

## REPORTING RESULTS

At this point it is important to remind yourself and any readers what items are and are not included in the unit costs you have calculated. For example, your unit cost does not include drugs and x-rays unless you specifically allocated the costs of those services to other final cost centers, during steps 5 and 6.

In today's economy, getting the most value from your Cath Lab—in terms of operational throughput,



human capital, and patient and physician satisfaction--is crucial to survival in the increasingly competitive market for cardiovascular services. In the case of a growing or expanding program, understanding the complex workings and inter-relationships within the Cath Lab setting is especially important to future success. The Cath Lab is unique with the staff working elbow-to-elbow with the cardiologist in a collaborative setting to provide care in an often intense clinical situation. Ensuring that a Cath Lab is operating efficiently and effectively, while also providing the highest quality care in this environment is not always easy.<sup>7</sup>

In order to maximize teamwork, performing a detailed, comprehensive operational assessment is necessary. This assessment can be an invaluable tool for creating a competitive edge in terms of clinical outcomes, operational efficiency, and/or financial performance.<sup>8</sup>

In any assessment process it is important to understand the base-line performance. Key steps must be taken to evaluate the program from start to finish in order to define areas of outstanding performance and also those that could use improvement. Despite the industry-wide focus on quality, and the endless quest for 'best practice' at all hospitals, making change can be difficult. (Sustaining change can be even more of a challenge!) Indeed, a thorough assessment of operations can be performed internally, though the process is best completed with a neutral third party. Often, an external consultant is needed to make those "tough" recommendations and bring fresh ideas to the table for improvement and/or change.<sup>9</sup>

An example of a simple problem that often involves strong recommendations is related to on-time case starts. Most Cath Labs struggle with this issue (first case of the day and on-time starts for those to-follow cases), and sustainable solutions can be elusive. A root cause analysis can bring hard data to what often becomes 'finger pointing' between staff and physicians, or between the Cath Lab and the patient care areas.<sup>10</sup>

Another important element to assess is how patients are scheduled and if it works efficiently for the cardiologists, patients, and Cath Lab staff. Is there a holding area for staging patients pre- and post-procedure? If so, does it cover the Cath Lab sufficiently with staffing and hours of operation?<sup>11</sup>

Part of a thorough Operations Assessment includes a SWOT Analysis:

Strengths (S) support the positive aspects of the program. Examples include a facility design that is conducive to optimal patient flow or a leadership team that takes a crucial role in the program development.

Weaknesses (W) can be found in financial losses, staff competencies, or lack of physician champions. These are areas for improvement or sometimes can be unavoidable obstacles that will need addressed.

Opportunities (O) enable a focus on development and can lead to potentially increased revenue and better care delivery.

Threats (T) are the outside influences that can negatively impact a program's bottom-line, frequently from a competitive or regulatory standpoint.<sup>12</sup>

Although the investments to create a CCL are high, hospitals were historically been able to achieve their economic return of investment rapidly because of the relatively high contribution margins (CBMs) on many procedures performed within the department.<sup>13</sup> During the last decade, realizing a return of this investment has become increasingly challenging.<sup>14</sup> Hospital budget constraints, changes in DRG assignments, and a decreased level of public founding have put an enormous cost pressure on hospitals in many industrial countries.<sup>15</sup> In response, healthcare providers developed marketing strategies to increase patient number and throughput.<sup>16</sup> Furthermore, the importance of cost control instruments has increasingly been recognized.<sup>17</sup>

## METHODOLOGY

The research methodology employed in this study to identify improvement areas and to make implementation recommendations for the overall Cardiac cath lab system is DMAIC. It includes the five stages of the six-sigma approach to identify potential areas of improvement and to suggest recommendations aiming at an overall process improvement, shown as follows:

1. Define: Study and understand the existing CCL system
2. Measure: Develop process maps and conduct time studies and collect all relevant system related data
3. Analyze: Analyze the collected data by bar diagrams and fish bone analysis
4. Improve: Make recommendations for continuous process improvements

5. Control: Ensure that the recommendations are implemented and followed methodically.

**Duration of the study:** This study was carried out for duration of 3 months.

**Data Collection:** The secondary data has been obtained from hospital information system. The study involved historical data collection of 3 months

### OBSERVATIONS & DISCUSSION

The overall process map for the system is displayed in Figure 1, showing the flow through different processes along with their corresponding departments. In order to better understand the complex nature due to the differences in process flows among outpatients, inpatients, and emergency patients, individual process maps were developed for each type of patients

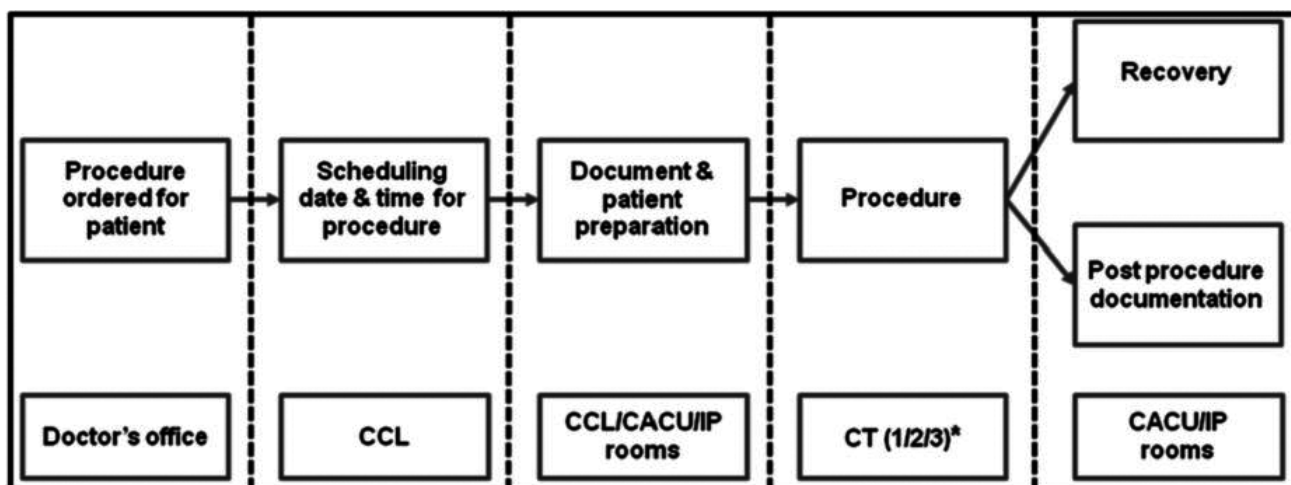


Figure 1: Process mapping

The following Table no 1 provides a summary of financial counselling done. The information of total number of procedures done is also provided. The total number of bills above the estimate is analyzed with percentage. Similarly, the total number of actual bills below and same as the estimated bills are analyzed with percentage.

Table 1: Variation between projected cost and actual cost

Series No.	Month	Percentage of Financial Counselling Given at NHHI	Total Number of Procedures Done	Total Number of Procedures Not done	Total Number of actual Bills above Estimate	Percentage of Total Number of actual Bills above Estimate	Total No. of Actual bills Below Estimate	Percentage of Total No. of Actual bills Below Estimate	Total Number of Actual Bills Same as Estimate	Percentage of Total Number of Actual Bills Same as Estimate
1.	Mar-16	93.75%	130	35	111	67.27%	18	10.91%	1	0.61%
2.	Apr-16	90.53%	112	41	103	67.32%	7	4.58%	2	1.31%
3.	May-16	97.60%	123	40	107	65.64%	11	6.57%	6	3.68%

Using the information from above table no 1, a pie chart can be plotted to get a better view of variance in the bills. The bills comprised of months from March 16 to May 16.

## Variance Percentage

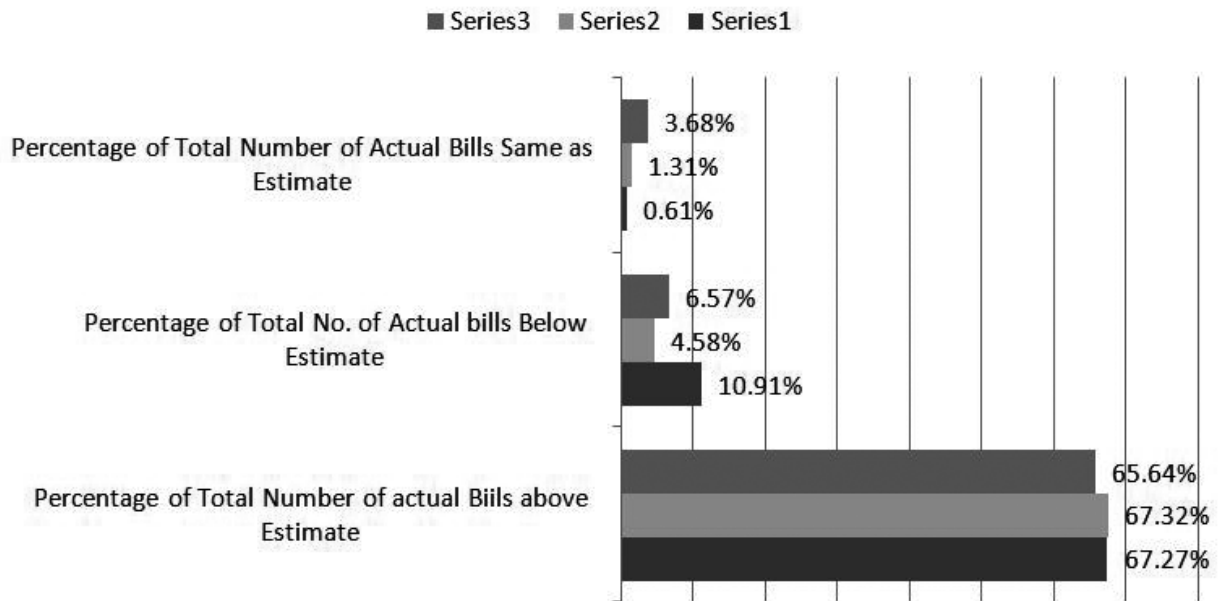


Figure 2: Total variance percentage of estimated and actual bills

The bar chart in figure 2 explains the percentage of actual bills above, below or same as that of estimated bills.

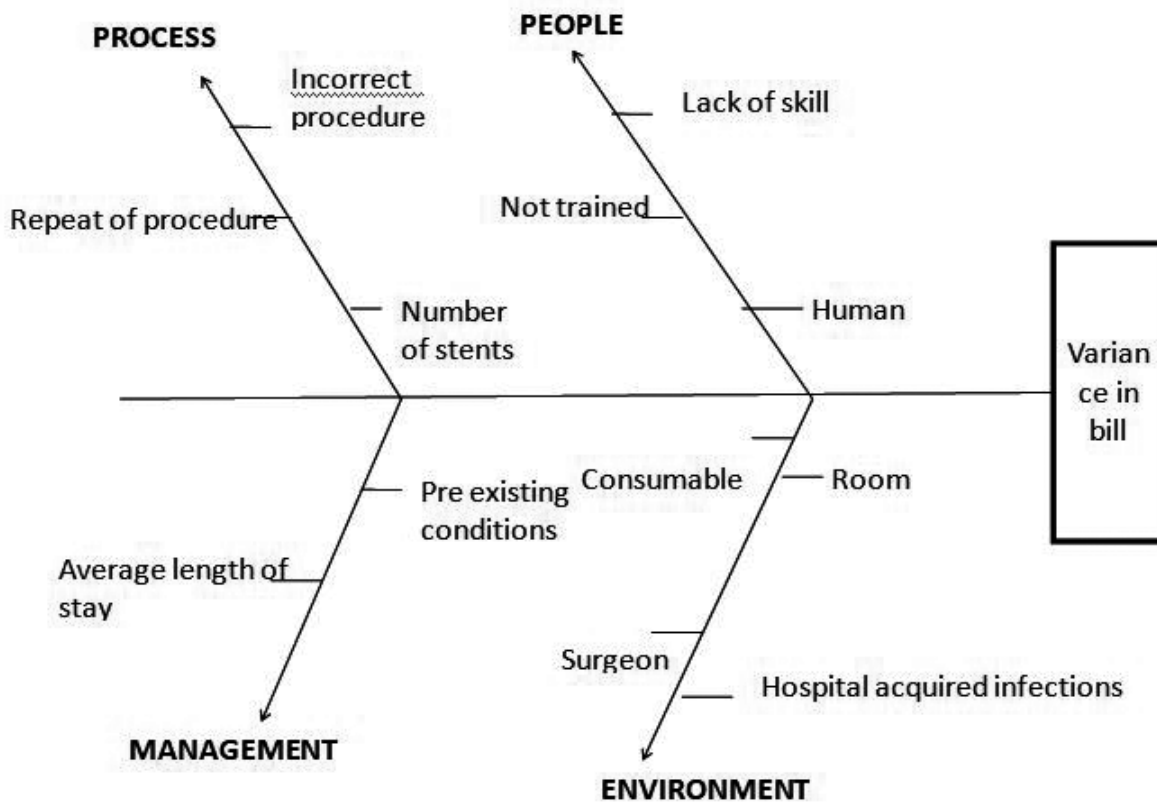


Figure 3: Fish bone analysis: cause and effect diagram

**Gap Analysis**

**Table 2: GAP analysis between skill & errors**

Sr. No.	Error	Justification
1.	Use of number of stents	The type and no of stents to be used is variable depending on the blockage in each patient
2.	Incorrect procedure	This can be controlled by following proper diagnostic procedures and SOPs
3.	Repeat of procedure	Can be controlled by following SOPs and use of skilled labour
4.	Human errors	Errors which occur during entering information cannot be controlled
5.	Lack of training and skill	Proper training should be imparted to personnel involved in giving estimates
6.	Hospital acquired infections	Can be controlled by following adequate measures as laid down by NABH/JCI or Quality Control Department of Hospital
7.	Room charges	Room can be upgraded if the patient requests. The room charges differ for that of deluxe, second class and general.
8.	Surgeon's charges	Can be controlled by standardizing the charges
9.	Consumables	The amount of consumables use is variable depending on each case
10.	Pre- existing conditions	Depending on medical history and pre- existing conditions, the procedural cost may vary for each patient
11.	Average length of stay	Can be controlled by providing quality care and following SOPs

**RECOMMENDATIONS**

As high amount of variance is seen between estimated and actual bill following measures can be adopted

- Proper medical management of patient. This would ensure that ALOS is maintained to the standard average.
- Financial counseling should be done by trained professionals who can clarify patient that procedure charges may vary with certain percentage.
- Repeat of procedures can be avoided by following SOPs and use of appropriate skilled force.
- Hospital acquired infections can be controlled by adopting measures laid down by Quality Control Department.
- Conduct trainings for staff at regular intervals.

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# Alienation, Attachment Style, and Alcohol Addiction “A Study of Young Women Habitual Drinkers”

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## ABSTRACT

**Background:** Alcohol addiction has been considered as a male phenomenon but, since past few years there has been a steep rise of habitual drinking among young women also. The researches on habitual Indian young women population are sparse. This paper tries to understand alcohol addiction only among college going young women students from the perspective of their attachment style that develops early in life and alienation.

**Aim:** To study the effect of attachment style on alcohol addiction among young Indian women. To study the association of alcohol addiction and alienation among young Indian women.

**Methodology:** Present study uses Ex-post facto design and a sample of 100 college going young Indian women (50= addictive and 50=non addictive) in the age group of 18-24 years.

**Result:** The Insecure attachment is significantly associated with alcohol addiction as well as feeling of alienation whereas, secure women who are habitual drinker show low score on alienation. Present study refutes the old association of alcohol addiction and resultant feeling of alienation among young women. On the contrary they form drinking group affiliations.

**Conclusion:** The results demonstrate that styles of attachment at an early age determines the pattern of association between alcohol addiction and alienation. Women with insecure attachment style are more likely to exhibit distrust and fear, and avoid closeness and intimacy in relationships with people around. Such circumstances could encourage alcohol addiction and “alienation” as the resultant feeling or cause of alcohol addiction among Indian women students. We need to systematically study reasons like paradigm shift in value system, changed life style etc.

**Keywords:** *Young Indian women, Alienation, Attachment Style, Alcohol, Addiction, Habitual Drinkers.*

## INTRODUCTION

Alcohol has been a part of social life with its ill effects from times immemorial, yet societies have always found it difficult to restrain their use<sup>1</sup>. Comparing with women, it is more common among men<sup>2</sup>. In western societies also, gender differences in drinking behavior are common<sup>5</sup>. In the past, alcohol consumption and its effects

has been as important ways to symbolize, and regulate gender roles for example, a symbol of masculinity<sup>3</sup>. But in past few decades there has been an increasing concern about drinking behavior among women. There has been a drastic change of trend seen in many substance abuse researches, articles, and reports indicating the rising graph of women substance abuse<sup>4</sup>. A general hypothesis about such change in drinking behaviors could be explained on the basis of increased opportunities for women to perform traditionally male roles. Particularly modern workplace have encouraged drinking among women and India is no exception<sup>6</sup>. Alcohol consumption, now is associated as a symbol of modernity, social status, power (in terms of equality), masculinity etc. apart from those all common socio-cultural indices<sup>3</sup>. We need to

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understand this steep rise of drinking behavior among women in light of their attachment style and feeling of alienation<sup>7</sup> because attachment theory provides a foundation to examine emotion regulation strategies in relationships, including drinking -to-cope<sup>8</sup>. Individuals in relationships hold mental representations, or working models, of themselves and of their parents/partner as an attachment figure<sup>9</sup>. Cognitions and behaviors used to manage distress, closeness and felt security in relationships, constitute individuals attachment styles<sup>10</sup>. These styles are commonly thought of as dimensions of anxiety<sup>11</sup>. Attachment anxiety is associated with hyperactivation of the attachment system, including strong desire for closeness and reassurance, whereas attachment avoidance is associated with hypoactivation of the attachment system, including a desire to maintain independence and emotional distance<sup>12</sup>. On this basis, it may be hypothesized that drinking-to-cope with personal problems is one such -specific behavior that insecure young Indian women may use to manage distress and restore feelings of security in a relationship<sup>13</sup>. Hence, present study aims at investigating the effect of attachment style on alcohol addiction and its association with feeling of alienation among young Indian women habitual drinkers.

## MATERIAL AND METHOD

**Study design:** The present study used contrast group comparison design. This is not an intervention based research and no clinical trials on samples were conducted. It was an ex-post facto research design of only young women college students.

**Participants:** 100 young Indian women students based on purposive nonprobability sample of 50= addictive who were attending college regularly and were habitual drinker in the age group between 18-24 years (enrolled in college semester I to VI) and 50=non addictive (similar but random sample), comprised the sample of the present study. Informed consent of the participants was obtained before conducting this study and those consented to participate were included in the study. The study was conducted over a period of one year in 2016- 2017 from different universities and private colleges in Rajasthan.

**Reason for choosing this sample for the present study:** It is painful to accept that the universities and

the colleges (the educational institutions) are becoming common places for the availability, experimentation, peer pressure and succumbing to alcohol and drug consuming and trading. As youth is said to be the most vulnerable stage of struggle between urge of independence and lack of direction, because they are exposed to all kinds of temptations (risky behaviour, adventures, peer pressure etc.). Alcohol consuming was considered as a male phenomenon and a considerable stigma associated with female drinking specially in India, but during past decade drinking among female has witnessed a steep rise, though with its consequences. Therefore, it is pertinent to study habitual drinking behaviour among young Indian women so college going women sample, becomes pertinent sample for this study.

**Inclusion criteria:** Young women students registered as regular students who were alcohol addict consuming alcohol regularly as a habit.

**Exclusion criteria:** Young women students who are registered as part-time/distance education and were occasional drinkers.

**Procedure:** The Adult Attachment Scale developed by Hazen and Shaver (1990) which is a Likert- type 18 items scale with a reliability by Cronbach's Alpha coefficients of .69 for secure, .75 for Depend, and .72 for Anxiety (Collins & Read, 1990) and test-retest correlation (for a 2-month period) of .68 for close, .71 for depend, and .52 for anxiety. It measures Secure, Anxious and Avoidant attachment style<sup>14</sup>.

The Alienation Scale by Hardeo Ojha which is a 20 statements scale that measures composite feeling of alienation by six factors—I. Powerlessness, II. Normlessness, III. Meaninglessness, IV. Social Isolation, V. Self-Estrangement, VI. Cultural Estrangement. Reliability and validity of the scale as reported was 0.83. and 0.77 respectively reported on the basis of kuder-Richardson formula-20 for internal consistency and test-retest reliability<sup>15</sup>.

Statistical Package for Social Sciences, Version 22 for Windows was used to analyze the quantitative data. ANOVA, t-test of significance and Chi-Square (equal probability) were computed. 0.05 level of confidence was used to interpret the results.

**Findings of the present study:**

**Table 1: Mean comparison of alienation in relation to attachment style**

Attachment Style	Mean alienation score	Std. Error	df	t-value	Level of significance (p value)
Insecure	59.196	1.147	98	2.225	.029**
Secure	54.508	1.023			

\* Significant at = .05\*; .01\*\* beyond .01\*\*\*, N=100

**Table 2: Mean comparison of alienation in relation to addiction**

Alcohol Addiction	Mean alienation score	Std. Error	df	t-value	Level of significance (p value)
Addictive Female	54.473	1.056	98	-2.474	.015**
Non Addictive Female	59.232	1.117			

\*Significant at = .05\*; .01\*\* beyond .01\*\*\*, N = 100

**Table 3: Mean comparison of alienation in relation to attachment style and addiction**

Attachment Style	Addiction	Mean alienation score	Std. Deviation
Insecure	Addictive female	58.52	4.154
	Non addictive female	59.88	3.631
	Total	59.00	3.989
Secure	Addictive female	50.43	13.876
	Non addictive female	58.59	4.540
	Total	55.47	9.996
Total	Addictive female	55.12	10.233
	Non addictive female	59.00	4.276
	Total	57.06	8.043

**Table 4: ANOVA interaction of attachment style and addiction on alienation**

Source	F	df	Level of significance (p value)
Corrected Model	7.313	3	.000***
Intercept	5473.541	1	.000***
Addiction	9.587	1	.003***
Attachment Style	9.303	1	.003***
Addiction * Attachment Style interaction	4.897	1	.029**

\* Significant at = .05\*; .01\*\* beyond .01\*\*\*, N = 100

**Table 5: Frequency comparisons of alcohol addict young women on the basis of attachment style**

	Attachment Style		
	Insecure	Secure	Total
Addictive Female	29	21	50
Non Addictive Female	16	34	50
Total	45	55	100



**Table 6: Chi-square of Addiction and attachment style among Young Women**

	Value	df	Level of Significance
Pearson Chi-Square	6.828	1	.009***
Continuity Correction	5.818	1	.016**
Likelihood Ratio	6.912	1	.009***
* Significant at = .05*; .01** beyond .01***, N = 100			

## DISCUSSION

Alcohol addiction is a major cause of many problems and concern in our society<sup>3</sup>. Attempting to know the underlying dynamics of the development of these problems is a pertinent route of investigation. We need to understand the steep rise of women drinking behavior. Since, attachment theory provides a foundation to examine emotion regulation strategies in relationships, attachment style and alienation seems to be the base understanding women drinking behavior<sup>8</sup>. The statistical analysis ( $F= 7.313$ ,  $df=3$ ,  $p=.000$ ) shows a significant trend association of attachment style, feeling of alienation and alcohol addictive behaviour.

In connection with the addiction and alienation, results, contrary to common belief and existing literature<sup>2,7</sup> (alienation is positively associated with addiction as a cause as well as an effect) are found in the present study. Alienation mean score of addicted women was significantly lesser than non addicts ( $F=9.587$ ,  $df=1$ ,  $p=.003$ ;  $t=2.225$ ,  $df=98$ ,  $p<.029$ ; table 4 and table 1). This shows that addiction does not have alienation as an underlying cause, but group affiliation may reduce the feeling of alienation among addict women students.

In connection with attachment style and alienation the difference in alienation scores among young women with secure and insecure attachment style ( $F= 9.303$ ,  $df=1$ ,  $p=.003$ ;  $t=-2.474$ ,  $df=98$ ,  $p<.015$ ; table 2), shows a significant trend of insecure female students showing significantly higher feeling of alienation in comparison of secure females.

Conceding attachment style and addiction chi-square analysis (Table 5 and Table 6) revealed a significant association between attachment style and alcohol addiction among young female students ( $\chi^2=6.828$ ,  $df=1$ ,  $p=.009$ ). Out of total 50 addictive female, 29 reported insecure attachment style in comparison to

only 21 who reported secure attachment style. Whereas, out of total 50 non-addictive female participants, only 16 reported insecure attachment style as compared to 34 with secure attachment style. These findings provide strength to the aforesaid association that insecure attachment style favours alcohol addiction.

Finally, the significant interaction effect of attachment style and alcohol addiction on feeling of alienation ( $F= 7.313$ ,  $df=3$ ,  $p=.000$ ) shows that attachment style mediates the feeling of alienation among alcohol addicted young women. Basically insecure habitual drinker young women feel more alienated and secure habitual drinker use drinking groups as means of affiliation. The above results could be further discussed in light of the following:

**Firstly**, alcohol consumption symbolizes enhanced masculine protest among women. Consuming alcohol in large quantity has been always a mark of male superiority, but with the paradigm shift in value system, social norms and drastic change in the life style of the Indian women, these old assumptions have been turned down in modern times<sup>3</sup>. Drinking in parties is becoming socially accepted and is an expression of equality and group affiliation rather than drifting away and feeling alienated among women. **Secondly**, increased autonomy is growing at a fast pace. Therefore, alcohol may seem to enhance an expression of power and freedom of risk behaviour inherently rewarding and exciting part of life style of young Indian women<sup>3</sup>. With the increasing career opportunities women are entering in the professional world similar to male counterpart and emulate the similar life style<sup>2</sup>. In some instances, drinking is initiated as the job requirements drinking alcohol behaviour and is considered no more a taboo<sup>2</sup> which refutes association of alienation and drinking. On the contrary there seems a trend of lower scores of alienation among habitual alcohol drinking young women. Considering the attachment style and addiction, available literature reveal that insecure attachment leads to maladaptive behavior and use of alcohol as a coping strategy to manage distressing emotions<sup>16,17</sup>. Specifically, avoidant and anxious attachment styles may promote frequent alcohol consumption as adaptive process to cope with the feeling of distress<sup>18,19</sup>. Drinking may promote closeness and intimacy in the relationship by forming drinking groups<sup>20</sup>. The feelings of lack closeness, love, and affection in relationships prevails among people with insecure attachment style<sup>8</sup>, secure attachment style

promotes higher levels of trust, intimacy, satisfaction, resilience in an individual. These positive characteristics help in coping with emotions and mental stressors by sharing love instead of using coping mechanism of drinking behaviour as rescue for their attachment deficit behaviour<sup>16</sup>.

**Interaction effect of Attachment style and Addiction of Feeling of Alienation:** The interaction effect of attachment style and alcohol addiction for alienation has also been found significant ( $F= 4.897, df =1, p=.029$ ; table 4). This shows that alcohol addiction and feeling of alienation among young women habitual drinkers need to be understood in the light of attachment style. Interestingly, the results of the present study reveal that in the category of insecure women, addict as well as non-addict women, feel equally high alienation whereas, secure but addictive women score significantly low on scale of alienation as compared to non-addict. Thus, attachment style mediates the addiction and alienation hypothesis. Attachment style is established early in life. Only insecure attachment style may favour alcohol consumption and alienation as symptomatic adaptive behaviour.

**It is concluded that:** Addiction leads to high alienation under insecure attachment style and low alienation under secure attachment style among young women college students. The old established association of high alienation among alcohol addicts is not proved in the present study. It needs further exploration, if low alienation of women with secure attachment is due to natural high social affiliation and support in general or due to addiction or addiction is probably giving further group affiliation these women.

**Conflict of Interest:** The authors declare no conflict of interests.

**Ethical Clearance:** This is not an intervention based research and no clinical trials on samples were conducted. Informed consent was taken from the participants.

**Source of Funding:** Self

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# Challenging Issues in Health Economics

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## ABSTRACT

The present study on health economics throw light on two major issues of scarcity of allocation, namely the Health and the Healthcare. Right from micro level to macro level the health issues are to be considered seriously in the economy. The current study expresses the role of State, role of doctor and role of individual etc., to improve the public health are discussed elaborately. There are seven chapters in this article. Chapter one initiate the basics of health economics. Chapter two continued with scope of health economics. Chapter three enlists the literature review. Chapter four highlights the issues in public health. Chapter five envisages the strategies to improve the public health. Chapter six analyses the determinants of public health. The final chapter concludes the challenging issues in Health Economics.

**Keywords:** Health, Healthcare, Public health, Productivity, Health economics

## INTRODUCTION

Health economics is defined as a branch of economics concerned with the related to scarcity in the allocation of health and health care. These are the main components of health economics. These are the main components of health care. WHO, in 1948, defined the term health as a state of complete physical, mental and social well-being and to merely the absence of disease and infirmity? It is in fact, governed by the socio – economic, cultural and environmental factors. In medical terms the word health refers to an organism's ability to efficiently respond to challenges and effectively restore and sustain a state of balance. In the alternate medicine, the term health refers the overall state of well-being or wellness.

The second component, health care, refer to the prevention, treatment and management of illness and the preservation of mental and physical well-being through the services offered by medical, nursing and allied health professions. In the recent past the definition for health economics was modified to include the ability to lead economically and socially productive life. Recently, the term health economics is replaced by medical economics. Medical economics, of course, deals with the cost-benefit analysis of pharmaceutical products and cost effectiveness of various medical treatments.

**Scope of Health Economics:** The scope of health economics includes five distinct topics, viz

1. Factors determining health
2. Significance of health
3. Demand for healthcare
4. Micro economic evaluation at treatment level
5. Market equilibrium of public health can be achieved by integrating these five areas, namely, Health care financing market-Physician and nurses service market-Institutional services market-Input factor market-Professional education market

Therefore, an attempt made in this paper to discuss the issues related to the public health, approaches ad strategies of public health programme and also made an attempt to examine the relationship among the health expenditure and a few macroeconomic variables such as education expenditure, GNP, Productivity etc., Secondary date and the concept of Regressions were used to examine the importance and the relevance of health economics in the economic development of India.

Health is a state of total effective physiological and psychological aspects of the mankind. It is a relative and an absolute concept of an individual as well as group of people. Health is the outcome of combination of many forces: intrinsic and extrinsic and collective, private and public medical environment and it is conditioned by socio- economic cultural and legal status of the society.

## REVIEW OF LITERATURE

Michel Grossman,<sup>1</sup> According to him, in production of health, medical care is one input but not the only one. He also rise a question that what factors might affect the efficiency of individuals and families in producing health? He proved that there is a high correlation between health and schooling. Grossman also shows both theoretically and empirically that higher income does not necessarily lead to higher levels of health.

Anuradha De, Tanuka Endow<sup>2</sup> (2008) in their working paper on the title "Public Expenditure on Education in India, Recent Trends and Outcomes" found that public expenditure on education in current prices has been growing at the compound annual growth rate (CAGR) of 13.4 per cent p.a. for the period 1990-91 to 2003-04 the rate of growth has slowed down in the present decade. Moreover their study indicates that expenditure in constant prices shows a much lower CAGR of only 6.5 percent for the same period. Though the expenditure has almost doubled between 1990-01 to 2000-01, it had stagnated and even decline since then. As a proportion of GDP the share of public expenditure on education has been less than 4 per cent. There have been major changes in the composition and modalities of expenditure on education.

Valentino Piana,<sup>3</sup> in his study, expresses the significance, composition and determinants of public expenditure. According to him, "Public expenditure is the value of goods and services bought by the state and its articulations.... Public expenditure is characterized by a high degree of inertial and law-dependency which tempers the will of the current majority".

Dr. Vathsala et al,<sup>4</sup> (2001) in their study had rightly pointed out, "Review of the actual pattern of Budgetary provisions and public expenditure during the nineties indicate that the envisaged careful balancing of the rolls of the State and the Market did not materialise and permeate the planning process of the Centre and the State and the Budgetary constraints and fiscal deficit reduction objectives had led to compression of public investment and Government expenditure leading to a slowing down of the process of Economic Growth."

**Public Health:** Health economics refers to the organized efforts or preventing diseases, enhancing life span and promoting efficiency of the people in the society. The

advancement of medical and scientific knowledge, social and political changes and expansion of public health work promote the health status of people. The available record of data proved that there is very strong association between the level of economic development and health status of people. In, the birth was per 1000 of population and death rate was 29 per 1000 population and the death rate was 9 per 1000 in the advanced countries. Whereas the birth rate was 29 per 1000 population and the death rate was 11 per 1000 population.

For the same period the infant mortality rate was in the advanced countries whereas it was 72 in the under develop countries. The birth rate, death rate, infant mortality rate and the life span depend upon the health status of the people which in turn is determined by the level of nutrition, Sanitation, literacy rate health expenditure and economic development.

### **Strategy to Promote Public Health: Role of the State:**

Promoting public health can be advised only with the combined efforts of Central, State, private organisation, doctors and the people. State and the Central government should have integrated health policy to all. The policy should be focused more on rural people who are actually the victim of poor health. The availability of doctors' per 10,000 people must be increased. Incentives to the doctors who work in the rural areas. The registered medical practitioners should serve at least 10 years i rural villages. Service offered in rural villages must be the criteria for promotion i their profession. Rural health camp must be organised every month in each village in the State. Mobile dispensary service must be provided in the remote villages. Huge amount should be spent on health.

**Role of Private People:** Private hospitals must encouraged and established in the rural villages. Proper incentives like free land, loan at differential rate of interest for medical equipments and adequate infrastructure such as water, power and pleasant stay at villages must be provided to the doctors, by the entrepreneurs or the private limited companies.

**Role of Doctors:** There are many factors which promote health status of the people. But the role of doctor's in promoting public health is more important than other factors. There should be service bent of mind among the doctors. They should realise that serving the poorest of the poor is their religion and God. Unless they have courtesy, love and hundred percent involvements to

serve the rural people, achieving health for all, will be a dream for ever. They should have human touch in their treatment. Just the mechanical way of treatment will never benefit the patients.

**People and Their Health Awareness:** It is ultimately, the people to appreciate and avail the available medical facilities. This is possible with little bit of knowledge on the importance of health in their development. Therefore, the level of education, health education and health awareness are very important factors which promote public health. Creating health awareness among the people should be compulsory, extracurricular activity such as off the campus extension programmes are for the medical student. The final year medical student should have village visit project work on “health awareness” as part of their academic work. One month Village camp should be part of their medical studies in which they should get exposure to the village people on the basic health and its importance. The health insurance policy should reach the people in the village. They should realise the importance of health insurance. Due to their ignorance and lack of money i.e., due to poverty they are not able to take utmost care in their health conditions. Due to poor health, many people are spending more money on medicines and unable to concentrate on their profession more efficiently.

**Determinants of Public Health:** The public expenditure on health and education may be influencing the status of health directly and more prominently compare with other macroeconomic variables. Table-I shows the data on the percentage of health and education expenditure in the total public sector outlay since 1985-86.

**Table 1: Percentage Of Education Expenditure in Total Public Sector Outlay In India**

Year	% of education	% of health Expn	%of both Expn
1985-86	2.7	1.8	4.5
1986-87	3.1	1.6	4.7
1987-88	4.2	1.7	5.9
1988-89	4.5	1.7	6.2
1989-90	4.5	1.6	6.1
1990-91	3.9	1.9	5.8
1991-92	4.0	1.4	5.4
1992-93	3.9	1.7	5.6

Conted...

1993-94	3.9	1.5	5.4
1994-95	4.0	1.7	5.7
1995-96	4.9	1.8	6.7
1996-97	5.9	5.6	11.5
1997-98	5.9	7.5	13.4
1998-99	6.4	10.3	16.7
1999-00	6.2	8.5	14.7
2000-01	7.1	8.8	15.9
2001-02	6.0	7.5	13.5
2002-03	4.8	5.8	10.6
2003-04	9.7	4.4	14.1
2004-05	9.9	4.5	14.4
2005-06	10.2	5.7	15.9
2006-07	10.7	5.1	15.8

Sources: [www.indiabudget.gov.in](http://www.indiabudget.gov.in)5

The above table shows that the percentage of education expenditure was ranging from 2 to 5 percent in the total outlay. The percentage of health expenditure in the total public sector outlay was just less than 1.8 per cent until 1995-96. It was on an average 6 per cent in the late 1990’s but it was around 10% in the middle 2000. Percentage of both the health and education expenditure was, on an average, 15 per cent for the same period.

**Indicators of Health:** Birth rate in India was 36.9 per 1000 population in 1971 and it reduced to 25.8 in 2000. The reduction of both rates occurred in last. three decade was marginal. Similarly death rate was 14.9 per 1000 population in 1971 and it reduced to 8.5 in 2000. It shows sizable reduction in the death rate due to the improvement in the health status of the people.

Expectation of life at birth year was 19.4 for male and 20.9 for female. In 2000 they were 63.9 and 66.9 respectively for male and female. This is the achievement we made in the last ten decades. This lengthy process may be due to the poor allocation towards health and education expenditure in India.

**Table 2: Birth rate and death rate of India since 1950**

Year	Population (million)	Birth rate (per 1000)	Death rate (per 1000)
1950-51	359	39.9	27.4
1960-61	434	41.7	22.8

Table No. 2 Conted...

1970-71	541	36.9	14.9
1980-81	679	33.9	12.5
1990-91	839	29.5	9.8
2000-01	1019	25.4	8.4
2002-03	1055	24.8	8.0
2003-04	1073	24.1	7.5
2004-05	1090	23.8	7.6
2005-06	1112	23.7	7.5
2006-07	-	23.1	7.4
2007-08	-	22.8	7.4
2008-09	-	22.5	7.3
2009-10	-	22.1	7.2
2010-11	1210	21.8	7.1
2011-12	1210	21.6	7.0

Sources: www.indiabudget.gov.in5

It is vivid from table-2 that birth rate (per thousand) reduced to 23.8 in 2004-05 from 27.4 in 1950-51. This shows the positive effect of the implementation of population policy in India. Table- 3 shows that infant mortality rated declined to 56 in 2005 from 129 in 1971. Table-4 shows that the life expectancy at birth increased to 62.9 in 2000-05 from 20.15 in 1911-20. These rates indicate the improvement in health status of people in India.

Table 3: Total infant mortality since 1971

Year	Rural	Urban	Combined
1971	138	82	129
1981	119	62	110
1990	86	50	80
1991	87	53	80
1992	85	53	79
1993	82	45	74
1994	80	52	74
1995	80	48	74
1996	78	46	72
1997	77	45	71
1998	77	45	72
1999	75	44	70
2000	74	44	68
2005	-	-	56
2007	-	-	55
2008	-	--	53

Table No.3 Conted...

2009	-	--	50
2010	-	-	47
2011	-	-	44
2012	-	-	42

Sources: www.indiabudget.gov.in5

Table 4: Total life expectancy

Year	Male	Female	Total
1911-20	19.4	20.9	20.15
1921-30	26.9	26.6	26.75
1931-40	32.1	31.4	31.75
1941-50	32.4	31.7	32.85
1951-60	41.9	40.6	41.25
1961-70	46.4	44.7	45.65
1971-80	50.9	50.0	50.45
1981-90	57.7	58.7	58.20
2000-01	63.9	66.9	65.40
2002-03	61.8	63.5	62.65
2000-05	-	-	62.90
2006-10			66.1
2010-12			66.0

Sources: www.indiabudget.gov.in5

**GNP and Health Expenditure**

$$GNP = f(HE); Y = a + Bx$$

$$Y = GNP; X = Health expenditure$$

$$R^2 = 0.84; t = 1.29; F = 105.5$$

The Estimated R<sup>2</sup> explains about 84 percent of the variations in the Gross National Product. As the estimated 'F' value is greater than its table value at 0.05 percent level, the overall regression models is statistically significant.

**GNP and Health Education Expenditure**

$$GNP = f(HE+EE)$$

$$Y = a + b_1X_1 + b_2X_2$$

$$Y = GNP;$$

$$X_1 = Health expenditure$$

$$X_2 = Health expenditure$$

$$R^2 = 0.81; t = 3.42; F = 71.68$$

The estimated R<sup>2</sup> explains about 81 percent of the variation in the GNP. The 'F' value is statically significant at 0, 05 percent level. The overall regression models are statically significant as the estimated 'F' Value is greater than its table value at 0.05 per cent level. The results reveal that the level of health expenditure influences GNP positively.

**Productivity and Health Expenditure and Education Expenditure**

$$Y = a_1 + b_1X_1 + b_2X_2$$

Y= productivity

X<sub>1</sub>= Health Expenditure

X<sub>2</sub>= Education Expenditure

$$R^2 = 0.83; t = 13.92; F = 82.06$$

The estimated R<sup>2</sup> reveals that the level of health and Education expenditure jointly explains 83 percent variation in the dependent variable. The influences of health and education expenditure on the level of productivity is statistically significant as the estimated ‘t’ value is greater than the table value. The model is statistically significant as the estimated ‘f’ value is greater than the table value.

**Productivity and Health Expenditure**

$$Y = F(HE); Y = a + bX_1$$

Y productivity

X<sub>1</sub> = Health expenditure

$$R^2 = 0.89; t = 18.16; F = 162.9$$

The model reveals that the independent variable influences the level of productivity 89 percent. The association between the level of productivity and the level of health expenditure is statically significant as the estimated ‘t’ value is greater than the table value. The whole model is statistically significant as the estimated ‘f’ value is greater than the table value.

**GNP and Education Expenditure**

$$GNP = f(EE)$$

$$Y = a + bX_1$$

Y = GNP

X<sub>1</sub> = Health Expenditure

$$R^2 = 0.91; t = 4.50; F = 216.54$$

The model reveals that the independent variable is responsible for 9.1 per cent verification in the dependent variable. The association between the level of GNP and the level of Education expenditure is statistically significant and the whole model is statistically significant as the estimated ‘f’ value is greater than the table value.

**CONCLUSION**

The study concludes that the level of health and education expenditure influences the level of GNP and the productivity positively. The government may enhance the percentage of expenditure on health and education in the total outlay. Proper and effective integrated policy must be evolved to provide adequate health facilities for all people by increasing the outlay on health programmes from the state and the private sector especially to the rural poor. Proper incentives must be introduced to private health investors and doctors who work to promote health services in the rural villages. Government should evolve suitable policy to create health awareness among the village people unless we make the people to understand that health is wealth, wealth cannot be accumulated and development shall not be achieved. Therefore, let us make wealth nation through healthy people.

**Ethical Clearance:** Completed. (Dept. level committee at VELS)

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**Conflict of Interest:** NIL

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# Examining the Impact of Development Projects' on the Project Affected People: A Study in Kalinganagar Industrial Estate, Odisha, India

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## ABSTRACT

**Purpose:** The paper studies the impacts of development projects and their CSR activities on the Project Affected People (PAP) of Kalinganagar Industrial Estate of the state of Odisha.

**Method:** Primary data has been collected using Focused Group Discussion (FGDs) and secondary data from relevant literature. Data obtained have been processed through *sentiment analysis*.

**Findings:** It was found that the companies operating in the region have performed well in economic dimension where as underperformed in social and environmental dimensions.

**Suggestion:** The present research recommends that development projects should work on social and environmental dimensions of CSR and sustainability, instead of taking these as trade-off for economic development. Further research may be conducted on the social and environmental dimensions in the context, specific of tribal displacement.

**Keywords:** CSR, Development Projects, Project Affected People, sustainability, Triple Bottom Line

## INTRODUCTION

The nation whose economic development is highly dependent on their natural resources, the contribution of development projects such as mines and minerals industries etc to the Gross Domestic Product (GDP) cannot be ignored. India like other developing countries has been adopting the western model of development by going for mega projects. Government of Odisha, after the liberal economic policy of the country, also welcomed many more mineral based industries. The country generally prefers thinly populated areas, close proximity of mineral resources, availability of more government land and also necessary strategic location to establish industries. These areas are generally the forest areas thinly populated by mostly the tribals and other vulnerable sections of the society. With general illiteracy, lack of awareness and least resistance, they become the victims of development after displacement from their habitat. Consequent upon displacement, as Cernea (1997)<sup>1</sup> stated "Like becoming a refugee, being forcibly ousted from one's land and habitat by a dam,

reservoir or highway is not only immediately disruptive and painful, it is also fraught with serious long-term risks of becoming poorer than before displacement, more vulnerable economically and disintegrated socially."

**Development Projects, Tribal Displacement and CSR:** The mining and mineral industry has been identified as a sector in which social responsibilities as well as sustainability are central issues in the debates that arises within responsible corporate citizens (Cowell et al., 1999<sup>2</sup>; Macintyre et al., 2008<sup>3</sup>). Industry output and benefits have a tremendous impact and influence on economic growth. This is particularly so in the country like India where natural resources are one of the principal economic sectors and their impacts are particularly emphasized in developing economies (Dorian and Humphreys, 1994<sup>4</sup>).

The Development project operation, however, brought about irreversible effects on landscape and potential long term damage to natural environment (Ali and O' Faircheallaigh, 2007<sup>5</sup>). The most adverse impacts

are not only on the natural environment, but also the socio economic structure of the project affected families-PAFs (MMSD, 2002<sup>6</sup>). It is found that displacement in most cases results in landlessness, joblessness, homelessness, marginalization, food insecurity, loss of access to common property resources, loss of access to public services and social breakdown (Downing, T et al. 2001<sup>7</sup>; Cernea, 1997<sup>1</sup>). Lifestyle and health problems are a few of the several chronic problems and sustainability of the PAFs becomes a matter of concern.

CSR of the development projects can address many of the problems experienced by the PAFs. CSR was defined by the World Business Council for Sustainable Development to be

“the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large.”<sup>8</sup>

In this context, CSR is usually addressed using Triple Bottom Line (TBL) approach (Social Bottom Line- People, Environmental Bottom line-Planet and Economic Bottom Line- Profit. (Elkington, 1997<sup>9</sup>).

**THE STUDY**

**Location:** The study is conducted on PAFs of Kalinganagar Industrial Estate of Jajpur District of the state of Odisha, India. Kalinganagar is located near the chromite mines of Kaliapani , Kalarangi, Saruabila and Sukurangi and iron ore mines of Tamaka of Jajpur district. With the growing demand of steel at the international market, domestic and international players are vying to establish their plants in the region. Apart from being well connected with good railway infrastructure, two national highways passing through Kalinganagar also connect it

with Chennai and Kolkota. Over and above, the place is also blessed with the flow of the state’s second largest river- *The Bramhani* to meet its water needs.

**Industries:** A good number of industries have established their operations in the region displacing a large number of people mostly from tribal and other backward communities. Table 1 presents the names of the plants and land acquired by them for establishment by displacing the local people.

**Table 1: List of Plants and Land Allocated to Industries in Kalinganagar**

Names of the Plants	Land in acres
Mideast (MESCO)	530
Orion	150
Maithan Ispat	100
Uttam Gala	370
NINL	2500
Maharashtra Seamless	500
TISCO	2400
Rohit Ferrotech	50
JINDAL	678
VISA Industries	390
Dinbandhu	100
K J Ispat	50

Source: ADM Office, Kalinganagar (as cited in Pandey, 2008<sup>10</sup>)

**Affected People and their Life Styles:** Kalinganagar was residentially populated by tribal and other backward people. *Ho* tribal community constitute nearly 80 per cent of the population and rest of them belong to *Munda* and *Santal* community. In the absence of irrigation, the area is largely rain- fed and productivity remains at a low level. Table 2 presents the socio economic profiles of the villages displaced by Tata Steel and Maharashtra Seamless Companies.

**Table 2: Socio-economic profile of the three villages displaced by Tata and Maharashtra Seamless Companies**

Name of the Village/ anchayat	No. of Households	% of ST Population	% of SC Population	Literacy Rate	% of Cultivator	% of Agricultural labourers
Chandia	331	85.9	.2	37.6	41.0	36.2
Gobaraghathi	558	88.8	2.1	53.5	16.0	37.7
Gadapur	140	97.8	0	46.7	43.0	13.5

Source: Census 2001 (as cited in Pandey, 2008<sup>10</sup>)

Tribal economy was mainly subsistence oriented. They were engaged in food gathering, hunting, fishing and thus revolve around forests. They used to slash down trees and bushes and burn them into ashes which were used as manure for cultivation. They worship God for rain and good harvest.

Though tribal economy is shaky, their culture in its pristine state is rich and distinctive which they are proud to preserve. They used to manage the internal affairs very smoothly through the village council of elders. The council of elders meets on need basis to discuss matters concerning the welfare of the village.

They celebrate many festivals relating to marriage, birth or death within the family or a daughter attaining puberty and some others relate to sowing or harvest time. They celebrate the spirit of togetherness during festivals, consume *mahua* liquor, sacrifice animals to please deities and dance mirthfully.

Tribals are superstitious too and the 'ojha' (literally means doctor) occupies a honourable position. He not only prescribes herbs to recover from sickness but is also believed to exercise evil spirits.

**Tribal Displacement in Kalinganagar:** The Government of Odisha were trying to develop Kalinganagar Industrial area because of mineral reserves in the regions since early 1990's. The ongoing development programs of the State Government have negative fallout as far as the tribal people of the region are concerned. In fact, the root cause of their sufferings is these development projects which have led to destruction or loss of their ancestral territories, resources, values, political, economic and socio-cultural systems were not able to convince the displaced families with attractive resettlement and rehabilitation (RR) packages. The community and company confrontation reached extreme height when Tata started constructing its boundary wall for its steel project in the region in 2006. The situation went out of control and the police started firing at the tribal protesters which claimed 12 lives on spot and another later in hospital. The incidents made news headlines in national and international media as the innocent tribal people were made victims of development. Later, the Government of Odisha brought out the RR Act in 2006 for the displaced families.

**CSR in Kalinganagar Area:** Companies operating in the region are engaged in four thrust areas – Education,

Health, Livelihoods and Rural and Urban infrastructure. Besides, it will also undertake Interventions in the areas of sports, disaster relief, environment and ethnicity etc. The most remarkable RR and CSR initiative of Tata Steel is Tata Steel Parivar Rehabilitation Colony for the affected people. Besides, the companies such as Nilachal Ispat, Tata Steel, Jindal, and VISA are providing mobile medical services, scholarships or meritorious students, road construction, sponsorship for sports and tournament etc. However, though a period of one decade is over since the companies in the region started operation, no independent study has been conducted to measure the impact of these development projects on PAFs.

### Research Questions

Based on the above stated research gap, the following research questions have been developed to fill the research gap:

1. What are positive aspects and impacts (CSR) of the mining project on PAFs?
2. What are negative aspects and impacts of the mining project on PAFs?

### Objectives

1. To study the positive impact of the mining projects on the PAFs.
2. To study the negative impact of the mining projects on the PAFs.

### METHOD

The present research work employs the qualitative approach based on analysis of data obtained through Focused Group Discussion (FGD) to capture affected community perception of project impact. TBL variables are adopted from Vivero (2014)<sup>11</sup> and are presented in Table 3.

Stratified sampling is aptly selected to measure the impact of company operation on different castes and community strata. The concept of a mining community has been taken from the *Mines and Mineral Sustainable Development Report 2002* (MMSD Report 2002)<sup>6</sup> and moderated to suit the present research. As these three communities are not mutually exclusive, further classification has been made by the researcher to distinguish one from another. The basis for community strata is occupational shift. There are some *indigenous*

families who have been deriving their source of income through regular or contractual employment from the companies, and are considered to belong to *occupational communities*. Similarly, there are some families who have experienced a major occupational shift due to the development in the region, and they may have moved to being businessmen or drivers, laundry workers or shop keepers, among others. They are categorized under *residential communities*. The definition of indigenous families continues with their present occupation.

6 FGDs (2 from each community) have been conducted. The number of participants in each FGD was 10-20. The respondents have been informed about the purpose of the discussion and asked to feel free to express their opinions on what they perceive on the impact of the project. The discussions were made in local (Odia) language which was later translated into English for analysis. The findings of the study were processed through sentiment analysis.

**FINDINGS**

During FGDs, the participants identified development project impacts associated with three major *TBL* dimensions- *Social, Environmental and Economic*. In the social dimension, project impacts were perceived in respect to variables such as cost of living, demographic growth, education, family, health and indigenous issues.

In the social dimensions, project impacts have been perceived across the indigenous, occupational and residential communities as mainly negative except education and ethnicity. The participants across all the communities stated that demographic growth in the region has led to high cost of living which they are finding difficulties to cope with. The participants admired those educational initiatives undertaken by the companies in the region. Under Tata Steel scholarship scheme, some of the tribal children have the opportunity to pursue higher education in the prestigious institution like KISS University and have brought glory to the communities. However, participants from indigenous community apprehended that education disintegrates family as the educated members of the family leaves them for employment and there are some cases of inter caste marriage and separations among the educated members of the communities which pose threats to their cultural ethos. Monotony in family life has increased

affecting quality of life. Occupational participants admired health camps and mobile health services by Tata Steel. However, indigenous and residential community members stated that these health initiatives are quite inadequate since they have to depend on Cuttack SCB Medical College, 65 Km from the place for treatment of critical diseases. The affected families are looking for super speciality hospital in the region. The participants across all the communities are unanimous that the development in the region has not affected their indigenous character. They celebrate their festivals with spirit of pride and togetherness

In the environmental dimension, the project impacts are perceived by all the affected communities on the following topics: flora and fauna, pollution and water consumption. The affected communities have raised concern over the growing pollution due to industrialization and rapid disappearance of flora and fauna. There is massive uproot of trees because of the companies’ operation and their plantation drives under CSR of companies are quite meagre. However, occupational community presented both positive and negative views justifying ecological degradation for economic development. Environmental pollution is impacting the social lives and villagers are vulnerable to several respiratory diseases. Electricity price has also gone up in last one decade. Water usage in the region has been increased. Electricity price has also gone up in last one decade. Tata Steel is serving the communities with portable water supply and they are happy for it. However, they apprehended deteriorating quality of water that would like to incur in future when the industrial estate ages and industry releases high quantity of wastes. They are also scared of pressure on water resources by the industry usages.

**Table 3: Sentiment Analysis of the Discussion**

	Indigenous	Occupational	Residential
<b>SOCIAL</b>			
Cost of Living	-	-	-
Demographic Growth	-	-	-
Education	+	+	+
Family	-	-	-
Health	-	+/-	-
Indigenous	+	+	+

Conted...

<b>ENVIRONMENTAL</b>			
Energy Consumption	-	-	-
Pollution	-	-	-
Flora and Fauna	-	-	-
Energy Consumption	-	-	-
<b>ECONOMICAL</b>			
Development	+	+	+
Economic Growth	+	+	+
Local Employment	+/-	+	+

Affected communities' perceptions on economic dimensions have been examined in terms of development, economic growth and local employment. All the participants acknowledged the direct and indirect contribution of development projects to rural economy. There have been occupational changes due to industrial operation in the region. The nominated members of the displaced families have been placed by the local companies on the basis of their education. However, there are a few cases of family disintegration after such rehabilitation. Development in the region has offered many PAF members jobs to work as labourers, drivers, shop owners, laundry workers etc. However, some of the members regretted that development has not reached out to the affected family members equitably. Though employment opportunity in the region has increased in the region in the last one decade, nevertheless, there are unemployment problems among the affected communities. The development projects have given employments to the nominated members of the displaced families whereas other adult members who were engaged in land and allied activities became unemployed after their lands were acquired by the project. Many of them are living as disguised labourers in the region.

### CONCLUSION

Most of the development projects in India are doing well with economic dimension whereas their performance on environmental and social dimensions has invited criticism from the stakeholders. India plummeted 36 points from 141 in 2016 to 178 in 2018

in the Environmental Performance Index according to a biennial report put together by Yale and Columbia Universities along with the World Economic Forum. At the same time, development-induced displacement of tribal and other vulnerable families have not been able to provide impetus for social integration. In this connection, the present study recommends that TBL should be supported by technology and governance. Technology is important for a clean environment and governance should focus on policy implementation to deliver desired results. Input from the affected communities should be taken before deciding on any CSR project meant for them.

**Ethical Clearance:** Not Applicable

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Effectiveness of Hand Muscle Strengthening Exercises on Dominant Hand Pinch Strength in Smartphone Addicted Collegiate

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## ABSTRACT

**Background:** Smartphone Addiction is a dependence syndrome seen in certain mobile phone users. Smartphone gives us ability to connect with our friends and family, to news and entertainment, websites with just a tap of a touch screen. They have become a crucial part of everyday. The aim of the study was to find out the effectiveness of hand muscle strengthening exercises on dominant hand pinch strength in smartphone addicted collegiate.

**Methodology:** Study design was quasi experimental, pre test and post test type. 30 subjects of age 18-25 years with smartphone addiction score more than 40 in Smartphone Addiction Scale – Short version and using smartphone for more than one year were selected from SRM College of Physiotherapy, SRM Institute Of Science and Technology, Kattankulathur. Subjects with fracture or dislocation, soft tissue injuries, entrapment neuropathy, tumor or infections of upper limb were excluded. Dominant hand pinch strength was measured and hand muscle strengthening exercises were given to them for 4 weeks. Outcome measures were done by pinch meter.

**Results:** Smartphone addicted collegiate group has shown significant change in mean value from pre test to post test of pad to pad type of pinch (4.44 to 5.477), tip to tip type of pinch (3.59 to 4.52) and pad to side type of pinch (5.16 to 6.45) in dominant hand at  $p < 0.01$ .

**Conclusion:** The study concluded that hand muscle strengthening exercises have significant effect on dominant hand pinch strength in smartphone addicted collegiate.

**Keywords:** Smartphone addiction, hand muscle strengthening exercise, pinch strength, pinch meter.

## INTRODUCTION

Smartphone Addiction is a dependence syndrome seen in certain mobile phone users. The term addiction has replaced by the term dependence syndrome by world health organization.<sup>1</sup> Emanuel, Richard stated that, we are addicted to information, enjoyment and connections that smartphone delivers but not to the smartphone itself.<sup>2</sup> Smartphone provide us access to connect with our friends and family and to news and entertainment, websites with just a tap of a touch screen. In short smartphones have become a crucial part of our day to day activity.

For college students mobile phones are important integral part of themselves, nowadays mobile phones are important in maintaining social relationship. Most of the younger people cannot think of being without mobile phone and they never realize their level of addiction. Poor behavior control is a consequence of any addiction.<sup>3</sup>

Smartphone addiction begins as a simple behavior and gradually produces negative consequences. First the user uses the mobile for their need, such as texting, browsing and gradually the user involve in using mobile phone in dangerous situations like driving, crossing road. Smartphone user switch from liking the phone to wanting the phone.<sup>3</sup>

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Approximately 72% of people reported that they are rarely more than five feet away from their smartphone at any time. This is known as nomophobia, the fear that

being away from phone somehow disconnects them from world.<sup>4</sup> As like other types of addiction smartphone addiction also a problem that can be arise from some depression or other mental stress.<sup>4</sup>

Smartphone overuse may be leads to various musculoskeletal problems such as neck pain, upper extremity pain and upper back ache due abnormal positions that maintained while using it.<sup>5</sup> According to some studies smartphone overuse causes decrease in hand pinch strength and hand function.<sup>6</sup>

Hand grip strength and pinch strength are interferes with upper extremity function as hand strength reflects the hand function.<sup>7</sup> There are three types of pinches as follows pad to pad type in which there is opposition of pad of thumb to pad of the distal phalanges of finger (in two jaw type index finger is involved, in three jaw chuck type index finger and middle finger are involved), in tip to tip type tip of the thumb and index finger is involved, in pad to side type pad of the thumb and lateral side of index finger is involved. All these type of pinches are produced by combined action of intrinsic and extrinsic hand muscles.<sup>8</sup> strengthening exercise for these muscles may help to improve the pinch strength of smartphone addicted collegiate.

Normal pinch strength is important for college going students. Because pinch strength is indicator of upper limb strength as already mentioned. According to a study increased upper limb strength can improve the hand writing speed<sup>9</sup> which subsequently improve their academic performance.<sup>10</sup> No study was attempted to improve pinch strength in smartphone addicted people. Therefore there is a need for the study to find out the effectiveness of hand muscle strengthening exercise on dominant hand pinch strength in smartphone addicted collegiate.

The aim of the study was to find out the effectiveness of hand muscle strengthening exercises on dominant hand pinch strength in smartphone addicted collegiate.

### METHODOLOGY

Study design was quasi experimental, pre test and post test type. 30 subjects of age 18-25 years with

smartphone addiction score more than 40 in Smartphone Addiction Scale –Short version and using smartphone for more than one year and having dominant hand pinch strength <6 for girls and <10 for boys were selected in SRM College of Physiotherapy, SRM Institute of Science and Technology, Kattankulathur. Subjects with fracture or dislocation, soft tissue injuries, entrapment neuropathy, tumor or infections of upper limb were excluded. Dominant hand pinch strength was measured and hand muscle strengthening exercises were given to them for 4 weeks. Outcome measures were done by pinch meter.

50 college students were selected according to inclusion and exclusion criteria, and given Smartphone Addiction Scale questioner.<sup>11</sup> Out of fifty, 30 students those who got smartphone addiction score more than 40 were included in this study. Participants were explained clearly about the procedure and informed consent was obtained .Institutional Ethical Committee approval also obtained . Pinch strength of the dominant hand was measured for them with pinch gauge before intervention. During measurement, therapist hold the pinch gauge, participants were sitting with shoulder adducted, elbow flexed to 90<sup>0</sup>, forearm and wrist in the neutral position.<sup>6,12</sup> The participants were asked to do pad to pad pinch, tip to tip pinch and lateral pinch as hard as they can. Measurement of 3 trials with 30 seconds rest in between were taken and mean values of the these 3 trials were recorded.<sup>6</sup> Then following hand muscle strengthening exercises were given to them, ball squeezing, elastic band exercises, closed fingers, closed fist, fingers apart, opposition of thumb with 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> digits, straighten fingers, knuckle bend, karate chop, clay exercises.<sup>9</sup> Each exercise 20 repetitions on each day, weekly 5 continues days for 4 weeks. Post intervention measurement of the dominant hand pinch strengths were taken.

### DATA ANALYSIS

Dominant hand pinch strengths measures were calculated, analyzed and tabulated. The data analysis was done by using IBM SPSS version 20.

**Table 1: Comparison of Mean Values of Pre and Post Test of Dominant Hand Pinch Strength (Pad To Pad Type)**

Dominant hand pinch strength		Mean	N	Std. Deviation	Std. Error Mean	t -value	Sig.(2-tailed) p value
Pad to pad	Pre test	4.44	30	1.00194	.18293	-7.517	.000
	Post test	5.47	30	1.22673	.22397		



Table 1 shows the pre-test and post-test Mean, Standard Deviation, t-test and p values of Dominant Hand Pinch Strength (Pad to pad type) of smartphone addicted collegiate

Mean values of pad to pad type of pinch strength significantly improved from pre test to post test which is 4.44 to 5.47 in smartphone addicted collegiate.

**Table 2: Comparison of Mean Values of Pre and Post Test of Dominant Hand Pinch Strength (Tip To Tip Type)**

Dominant hand pinch strength		Mean	N	Std. Deviation	Std. Error Mean	t-value	Sig.(2-tailed) p value
Tip to tip	Pre test	3.59	30	.99004	.18076	-12.158	.000
	Post test	4.52	30	.89622	.16363		

Table 2 shows the pre-test and post-test Mean, Standard Deviation, t-test and p values of Dominant Hand Pinch Strength (tip to tip type) of smartphone addicted collegiate.

Mean values of tip to tip type of pinch strength significantly improved from pre test to post test which is 3.59 to 4.52 in smartphone addicted collegiate.

**Table 3: Comparison of Mean Values of Pre and Post Test of Dominant Hand Pinch Strength (Pad to Side Type)**

Dominant hand pinch strength		Mean	N	Std. Deviation	Std. Error Mean	t -value	Sig.(2-tailed) P value
Pad to side	Pre test	5.16	30	1.87784	.34285	-8.181	.000
	Post test	6.45	30	1.61176	.29427		

Table 3 shows the pre-test and post-test Mean, Standard Deviation, t-test and p values of Dominant Hand Pinch Strength (Pad to side type) of smartphone addicted collegiate.

Mean values of pad to side type of pinch strength significantly improved from pre test to post test which is 5.16 to 6.45 in smartphone addicted collegiate.

Statistical analysis of this study showed that smartphone addicted collegiate group have significant change in mean value between pre-test and post-test in pad to pad type of pinch, tip to tip type of pinch and in pad to side type of pinch in dominant hand.

Jonsson et al., (2007) stated that thumb reaching its utmost ROM while texting in the smartphone as it adjusted to reach the small key board. Putting thumb in this constant position for longer duration causes unwanted load transmission on intrinsic and extrinsic muscles of thumb. It may causes pain and fatigue in hand.<sup>13</sup>

## DISCUSSION

The objective of the study was to find out the effectiveness of hand muscle strengthening exercises such as ball squeezing, elastic band exercises, closed fingers, closed fist, fingers apart, opposition of thumb with 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> digits, straighten fingers, knuckle bend, karate chop, clay exercises on dominant hand pinch strength in smartphone addicted collegiate.<sup>9</sup> Hand grip strength and pinch strength are interferes with upper extremity function as hand strength reflects the hand function.<sup>7</sup>

Smartphone overuse may be leads to various musculoskeletal problems such as neck pain, upper extremity pain and upper back ache due abnormal positions that maintained while using it.<sup>5</sup> According to some studies smartphone overuse causes decrease in hand pinch strength and hand function.<sup>6</sup>

Most of users complaints about ache in carpometacarpal joint. They also insisted that distress in the upper extremity significantly correlated with total duration used up for mobiles and long duration of playing games in mobile device causes pain middle part of thumb and long duration of internet browsing causes pain in basal part of thumb.<sup>13</sup>

Jenkins et al., (2007) stated that 36% of college students who were doing their undergraduate program present with discomfort in hand.<sup>13</sup>

ESRA ERKOL INAL et al., (2015) stated that there was median nerve enlargement in smartphone addicts which might be depend on level of addiction not on

duration of smartphone use and there is a chance of development of carpal tunnel syndrome in smartphone addicts. Other than this smartphone addiction can also affect the pinch strength, causes the thumb pain. We could use the term hand smartphonopathy when above symptoms are present.<sup>6</sup>

Strength training improve the muscle force by improving acquisition, frequency and synchronization of motor units.<sup>14</sup>

Nikolaus Johannes Wachter et al.,(2017) concluded that the measurement of tip pinch, tripod pinch and key pinch can improve the follow up in hand rehabilitation of ulnar nerve lesion.<sup>15</sup>

Jose Manuel Perez-Marmol et al.,(2017) stated that exercise program for fine motor skills was effective to improve manual dexterity and also the active and passive range of motion. That is specific interventions of the hand are needed to prevent a worsening in range of finger motion in hand osteoarthritis.<sup>16</sup>

Strengthening exercise for hand muscles may help to improve the pinch strength of smartphone addicted collegiate. It may be due to some of the physiological and therapeutic effects of exercises such as increased requirements for oxygen and substrate in skeletal muscle removal of metabolites and carbon dioxide.<sup>17</sup>

Therefore this study revealed that hand muscle strengthening exercises has significant effect on dominant hand pinch strength in Smartphone addicted collegiate.

## CONCLUSION

The study concluded that smartphone addicted collegiate who underwent hand muscle strengthening exercises have shown improvement in dominant hand pinch strength. Therefore hand muscle strengthening exercises have effect on dominant hand pinch strength in smartphone addicted collegiate.

Limitations of the study were small sample size, lesser study duration, exercises were performed only once in a day, only dominant hand pinch strength was measured, only hand muscles were focused in intervention. Recommendations for the further study are larger sample size can be used, study duration can be increased, exercises frequency for per day can be increased, non dominant hand measurement can also be considered, intervention can be given to whole upper limb.

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# Effect of Traction Versus Counter Traction with Conservative Treatment on Adhesive Capsulitis

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## ABSTRACT

**Background:** Adhesive capsulitis, pain and decrease in range of motion are correlated with each other. This study was undergone to see the effect of traction versus counter traction with conservative treatment in adhesive capsulitis subjects.

### Objectives:

1. To determine the effect of traction on adhesive capsulitis.
2. To determine the effect of counter traction on adhesive capsulitis

**Method:** An Experimental study was conducted at Krishna College of Physiotherapy, Karad. 40 subjects with age group between 40-60 years were selected. A total of 40 subjects were equally divided into two groups. Both the groups received conservative treatment such as hot moist pack, Ultrasound, TENS, exercises. In addition, Group A received traction and Group B received Counter traction.

**Results:** On comparing both groups, counter traction (Group B) shown significant reduction in pain and improvement in range of motion for shoulder flexion and abduction.

**Conclusion:** Present study concluded that counter traction with conventional treatment shown to have significant improvement in pain and functional disability than traction with conventional treatment in adhesive capsulitis subjects.

**Abbreviation:** VAS: Visual Analogue Scale; ROM: Range of motion; SPADI: Shoulder Pain and Disability Index; GH: Glenohumeral; FLEX: Flexion; ABD: Abduction; TENS: Transcutaneous electrical nerve stimulation

**Keywords:** Adhesive capsulitis, traction, counter traction, conservative treatment.

## INTRODUCTION

Adhesive capsulitis is characterized by the development of dense adhesions, capsular thickening and capsular adhesions in the dependent folds of the

capsule<sup>7</sup>. It is also known as frozen shoulder which is one of the most common problems of the arm and it may last for several weeks. Codman introduced the term "frozen shoulder" in 1934 to describe patients who had a painful loss of shoulder motion with normal radiographic studies. There are global restrictions of GH joint motion. Prevalence of adhesive capsulitis in normal population is 2% and 10%-15% in diabetic population.<sup>4</sup> Adhesive capsulitis is caused by tightening of the joint capsule and results in stiffness and pain<sup>2</sup>. The pain is usually more at night and during activity. In some cases, it radiates down the arm.<sup>11</sup>

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Counter traction is the resistance or back pull made to traction or pulling on a limb. The study of using counter

traction was proved effective in shoulder dislocation and hence the attempt was made to study the effect of counter traction in the subjects with adhesive capsulitis.

Traction is usually applied to the arms, legs, spine or the pelvis. It is used to treat fractures, dislocations and long duration muscle spasms and to prevent or correct deformities.

Conservative treatment included hot moist pack, graded mobilization, free exercise, Strengthening exercise, TENS, ultrasound.<sup>12,9,13,14</sup>

**MATERIALS AND METHODOLOGY and PROCEDURE**

Goniometer, towels and data collection sheet were used for the purpose of counter traction.

The inclusion criteria were both male and female with right or left shoulder pain and restriction of movement. Subjects with the age of 40-60 years.<sup>5</sup> Subjects with or without diabetes. Subjects complained of minor pain, intermittent pain at the time of activity. Subjects with the old history of micro trauma, minor shoulder injuries, etc.

**1. VAS**

**Table 1: Comparison of pre and post VAS score within the group**

	PRE		POST		P VALUE	T VALUE	INFERENCE
	R	A	R	A			
GROUP A	5.60 ± 1.52	7.8 ± 0.93	4.12 ± 1.56	6.26 ± 0.92	P < 0.0001	13.984	Extremely significant
					P < 0.0001	15.587	Extremely significant
GROUP B	5.66 ± 1.23	7.90 ± 0.92	1.84 ± 0.67	2.74 ± 0.74	P < 0.0001	13.674	Extremely significant
					P < 0.0001	12.110	Extremely significant

Pre treatment VAS on rest and on activity was extremely significant with (P<0.0001) respectively. Post treatment VAS on rest and on activity was also extremely significant with (P<0.0001) respectively.

**2. ROM:**

**Table2: Comparison of pre and post ROM score within the group**

	PRE		POST		P VALUE	T VALUE	INFERENCE
	FLEX	ABD	FLEX	ABD			
GROUP A	64.35 ± 18.25	65.25 ± 18.94	68.75 ± 18.30	70.55 ± 19.78	P < 0.0001	12.034	Extremely significant
					P < 0.0001	7.339	Extremely Significant

A total of 40 subjects were selected in this experimental study. These subjects were equally divided into two groups. Conventional treatment was common in both groups. In addition, group A received traction and group B received counter traction.

Conventional treatment included hot moist pack for 15 minutes, grade 1 and 2 mobilization (3 set of 30 repetitions).<sup>12,9</sup> Free exercise such as wand exercise (10 repetitions), pendular exercise (10 repetitions), wall ladder exercise (10 repetitions), and shoulder wheel (10 repetitions). Strengthening exercise such as theraband exercise (10 repetitions)<sup>14</sup>. TENS on burst mode for 15 minutes around the shoulder joint<sup>13</sup>. Ultrasound for 7 min at the intensity of 1w/m<sup>2</sup> etc <sup>13</sup>. At the end of conventional treatment traction and counter traction was given respectively. Duration of treatment was 40 min for 5 days/week –for 2 weeks. The pre treatment and post treatment assessment was done by outcome measures like VAS, ROM and SPADI questioner.

**Data analysis:** The statistical analysis of VAS, ROM and SPADI scores was done by repeated paired t test and unpaired t test.

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GROUP B	61.15 ± 14.96	67.65 ± 13.51	69.6 ± 17.57	76.05 ± 15.27	P < 0.0002	4.505	Extremely significant
					P < 0.0001	4.857	Extremely significant

Pre treatment flexion and abduction was extremely significant with (P<0.0001) and (P<0.0001) respectively. Post treatment flexion and abduction was also extremely significant with the (P<0.0001) and (P<0.0002) respectively.

**3. SPADI:**

**Table 3: Comparison of pre and post SPADI score within the group**

	PRE INTERVENTION	POST INTERVENTION	P VALUE	T VALUE	INFERENCE
GROUP A	76.26 ± 7.13	65.43 ± 6.74	P < 0.0001	9.487	Extremely significant
GROUP B	71.53 ± 21.02	52.34 ± 18.93	P < 0.0001	10.188	Extremely significant

Pre intervention and post intervention SPADI was extremely significant with (P<0.00001) and (P<0.0001) respectively

male subjects and 14 were female subjects. The mean age of subjects included in Group A was 60.4 and in Group B was 59.3. Out of 40 subjects, 17 subjects have right side affected and 23 subjects have left side affected.

**RESULT**

On comparing both groups, counter traction (Group B) shown significant reduction in pain and improvement in range of motion for shoulder flexion and abduction.

Subjects were analysed and were divided into two groups according to random sampling method. 20 subjects were included in Group A and were received traction with conventional treatment. An education and home exercise booklet was also provided for the reference. The treatment protocol was continued for 2 weeks.

**DISCUSSION**

Counter traction is the resistance or back pull made to traction or pulling a limb. It may help in improving shoulder movements and reducing. The purpose of present study was to find out effect of traction versus counter traction with conservative treatment on adhesive capsulitis. The feasible training program aims to improve the activity of shoulder joint.

Pre treatment outcome measures for pain, ROM and functional disability was done with VAS (both on rest and activity), ROM and SPADI. The specific treatment protocol was followed for 2 weeks.

According to various studies it was analysed that counter traction may help in improving quality of life of subjects with shoulder pathology. This study aims to improve quality of life of subjects with adhesive capsulitis. In this study treatment protocol was given for two weeks.

Intra group comparison (within group) was analysed by paired t-test for VAS, ROM, SPADI score. This showed that there was extremely significant difference of Group A VAS score on rest with (P<0.0001). While there was extremely significant difference of Group A VAS score on activity with (P<0.0001). ROM scores were also extremely significant for both flexion and abduction with (P<0.0001). SPADI score shows extremely significant difference with (P<0.0001).

Advantages of counter traction–

- It helps to stabilize scapula of affected side.
- It produces equal force on affected shoulder

In this study, 40 subjects had participated who were diagnosed with adhesive capsulitis out of which 26 were

Similarly, In Group B, there was extremely significant difference of VAS both on rest and activity with (P<0.0001) respectively. ROM score was also extremely significant for both flexion and abduction with (P<0.0002) and (P<0.0001) respectively. SPADI score was also extremely significant with (P<0.0001).

Inter group comparison (between groups) was analysed statistically using unpaired t-test. This shows that pre intervention VAS on rest and activity was not statistically significant with ( $P<0.8916$ ) and ( $P<0.7226$ ). Pre intervention ROM was not statistically significant with ( $P<0.5479$ ) and ( $P<0.6473$ ), SPADI score with ( $P<0.3467$ ) was not significant. While comparing the post intervention values of VAS on rest and on activity was extremely significant with ( $P<0.0001$ ) and ( $P<0.0001$ ) respectively. ROM of flexion and abduction was not statistically significant with ( $P<0.8817$ ) and ( $P<0.3312$ ). SPADI score was statistically very significant with ( $P<0.0060$ ).

In this study, an attempt was made to improve range of motion and to reduce pain.

Improvement of subject on week 2 i.e. after the treatment program gets over.

- The subject could perform exercise independently
- There could be improvement in quality of life of subjects with adhesive capsulitis.
- There was reduction of symptoms in both the group but in group B there was marked reduction on symptoms were seen.

In conclusion, the result of current study shows that counter traction with conventional treatment is significant than traction with conventional treatment on adhesive capsulitis. Further studies can be done for longer duration of treatment protocol in order to determine the long term effect of this program.

Mohammad-Reza Ghane, Seyed-Hamed Hoseini, Hamid-Reza Javadzadeh, Sadroollah Mahmoudi, Amin Saburi\* *Chinese Journal of Tromatology* 2014;17(2):93-93 conducted a study on comparison between traction-countertraction and modified scapular manipulation for reduction of shoulder dislocation concluded that final success rate shows that traction countertraction there was a significant effect on reduction in treatment duration.<sup>8</sup>

## CONCLUSION

It was concluded that counter traction with conservative treatment shown significant effect on adhesive capsulitis than traction with conservative treatment.

**Conflicts of Interest:** This study can be carried out with various types of traction and counter traction methods and large number of sample size can be taken.

**Ethical Clearance:** Ethical clearance was taken from institutional committee of Krishna Institute of Medical Sciences Deemed to be University, Karad.

**Source of Funding:** Source of funding is Krishna Institute of Medical Sciences Deemed to be University, Karad.

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# Efficacy of Probiotic Drink Containing *Lactobacillus Casei Shirota Strain* on Factors Affecting Dental Caries

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## ABSTRACT

**Objectives:** To evaluate the effectiveness of probiotic drink on factors affecting dental caries.

**Materials and Method:** A three phase study where 12 volunteers were recruited with a DMFT score >3. The unstimulated saliva samples were collected prior to the start of intervention. The saliva samples were also collected after two weeks of consumption of the probiotic drink, Yakult (Yakult Honsha co., Ltd) and after wash out period of two weeks. These samples were cultured to detect the *Streptococcus mutans* level by colony count and to detect pH using pH strips. The volunteers were also asked to maintain a diet chart to determine sugar exposure.

**Results:** The mean of *Streptococcus mutans* colony count has significantly decreased from 27.17 (baseline count) to 2.50 (two weeks of intervention) respectively and has increased to 11.75 (washout period of two weeks). The mean of pH at baseline, after two weeks of intervention and after washout period were 6.08, 6.92 and 7.00 respectively. The correlation coefficient of dietary sugar exposure with *Streptococcus mutans* count for baseline and after two weeks of intervention were -.227 and -.007 respectively.

**Conclusion:** Probiotics when used as a regular drink reduces the *Streptococcus mutans* count in the oral cavity. People who have high sugar exposure can also control the oral microbiome with regular usage of probiotic with no significant variation in the salivary pH. It exhibits transient colonisation and lacks substantivity.

**Keywords:** Probiotics; *Lactobacillus casei shirota*; *Streptococcus mutans*; salivary pH; sugar exposure

## INTRODUCTION

Changes in the homeostasis of the oral ecosystem can lead to proliferation of bacterial biofilm causing initiation and progression of demineralisation activity resulting in dental caries.<sup>1</sup> *Mutan streptococci* are considered are strongly associated with onset of caries and are gram positive bacteria which form insoluble glucan for adhesion, aggregation and caries biofilm formation.<sup>2</sup>

The caries treatment by the medical model include limitation of the substrate formation, modification of the oral microflora, plaque formation disruption, tooth surface modification, stimulation of salivary flow and restoration of the tooth surface.<sup>2</sup> The interest in modulation of the oral microbial dysbiosis by fortifying the body with beneficial bacteria for restoring and maintaining oral health have gained a lot attention over the use of probiotics.<sup>3</sup> The concept of probiotic where live microorganisms are administered in adequate amounts to confer a health benefit have prompted the need for an alternative therapeutic and prevention strategy (FAO/WHO.2001).<sup>4</sup>

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Most of the probiotic bacteria belongs to the genera *Lactobacillus* and *Bifidobacterium spp.* which are the natural inhabitants of oral cavity and are

generally considered safe<sup>5</sup>. Studies done by *Caglar et al* have concluded that among the various species of lactobacillus, *L. reuteri* can reduce *S.mutans* count and can interfere the growth of oral bacteria which forms the biofilm. So *L. reuteri* can be a candidate probiotic for dental caries<sup>6</sup>. The advantage of incorporating probiotics into dairy products lies in their capacity to neutralise the acidic conditions.<sup>1</sup> Probiotics replace the pathogenic bacteria with non-pathogenic bacteria. This form of replacement therapy is achieved by their ability to secrete antimicrobial substances, compete with pathogens for adhesion sites on dental surfaces, alter environmental conditions of mouth and even reduce inflammatory response.<sup>1</sup> When probiotics are ingested, they are first exposed to the oral cavity and been contacted with the oral tissues. This adhesion could be the primary factor that facilitates the accomplishment of probiotic activity, its persistence and resistance to environmental factors in the oral cavity.<sup>8</sup> Commercially available forms of probiotics are Yakult, probiotic juice, Choconat, sporolac, genetically modified bacillus mesentricus<sup>7</sup>. Studies done by *Sooke et al* has proved the antimicrobial activity of *Lactobacillus casei shirota*<sup>9</sup> which is the main component of Yakult. Despite a low pH this drink has hardly caused demineralizing effect due to its high calcium and phosphate content. Milk proteins may also contribute to anti-caries effect.<sup>10</sup> Hence Yakult was selected as the study material.

The present study aims to evaluate the effectiveness of probiotic drink (Yakult) on factors affecting dental caries.

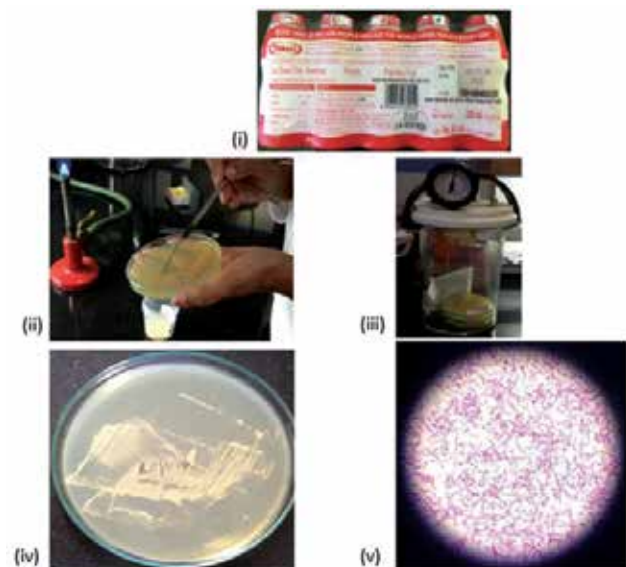
The objectives of the study were to;

- evaluate the effectiveness of probiotic drink in reducing the colony count of *S.Mutans* in saliva
- detect the change in salivary pH for caries risk evaluation
- correlate dietary sugar exposure with *S.mutans* count

## MATERIALS AND METHOD

This study was conducted in compliance with the protocol approved by the Institutional Ethics Committee. A total number of 12 adults with DMFT Score <3 based on WHO criteria and who were consented to participate in the study were included. Subjects who had lactose

intolerance, allergic to dairy products, habit of smoking and undergoing dental treatments were excluded from the study. The study was conducted for 4 weeks consisting of 2 weeks of intervention period and 2 weeks of followup period (T1-T2), Where (T1)-at baseline, (T2) -at the completion of consumption and 2<sup>nd</sup> week from T1 and (T3)-4<sup>th</sup> week from the base line and 2<sup>nd</sup> week from T2. Prior to the intervention period, the fermented milk, probiotic drink Yakult (Yakult Honsha co.,Ltd) containing a single probiotic strain of *Lactobacillus casei shirota* at a minimum concentration of  $6.5 \times 10^9$  viable cells per 65 ml bottle was tested for viability of probiotic species (Figure 1). Probiotic drink was shaken vigorously, 10 ml of this drink was mixed with sterile saline to make 100 ml, and 1 ml of this mixture was serially diluted with 10 ml saline. Aliquots (100  $\mu$ l) of the diluted sample were inoculated into the Rogosa Agar medium and incubated at 35–37°C for 48 hrs. After incubation, colonies were counted with a colony counter and photographed under a light microscope.



**Figure 1: Microbial analysis to test the viability of probiotic species in Yakult**

(i) The probiotic drink Yakult (ii) inoculation of the probiotic drink into Rogosa medium (iii) incubation procedure (iv) Viable *Lactobacillus* colonies (v) *Lactobacillus* colonies under light microscopic view

Oral examination of the subjects were conducted prior to the study using the mouth mirror and Community Periodontal Index probe and subjects were asked to maintain a diet chart<sup>11</sup> to evaluate sugar exposure during the intervention period.

Instructions were given to the participants to drink the study product after a meal (preferably at lunchtime and not right before bedtime) .They were advised to drink one whole bottle of Yakult (65ml) each day. They are advised to hold the drink for 2-3 mins in the mouth before they swallow. Participants were advised to keep their probiotic drink refrigerated, in order to preserve the viability of the probiotic bacteria.

Normal oral hygiene procedures such as use of toothbrushes, fluoride tooth pastes and dental floss were allowed throughout the study .The use of other fluoride products, similar probiotic products, and other medical oral rinse were forbidden. The participants were told to brush their teeth twice a day.

Saliva samples were collected three times at 0, 2, and 4 weeks, around noon time (11:00 a.m.–1:00 p.m.). 1-2ml of unstimulated saliva samples were collected from subjects. The subjects were allowed to spit the saliva in a pre-sterilized bottles. The saliva samples were analysed for the presence of *Streptococcus mutans* using *Mitis salivarius* agar. 1:10 dilution of saliva were made in phosphate buffered saline. 10µl of saliva sample was inoculated onto agar plates using micropipettes and evenly spreaded using presterilised glass spreader. The plates were then incubated at 37°C for 24 hours and left at room temperature for further 24 hours.Using a colony counter,number of colonies of *Streptococci mutans* were counted.

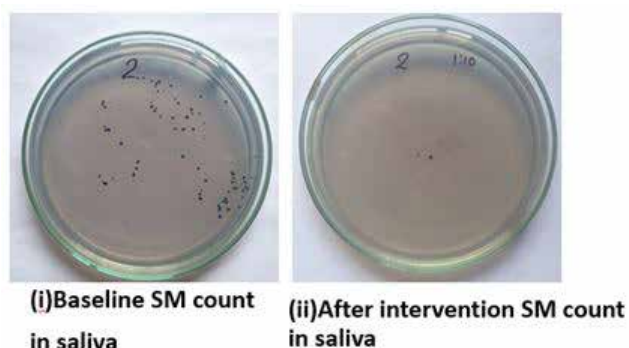
Salivary pH was also determined by using pH strips (EKI universal pH strips) as a supplemental indicator. A

drop of unstimulated saliva was pipetted onto the pad, and the result is read after 5 min. The color of this test pad was compared with a standard color chart after 5 min to estimate the final pH. The method grades unstimulated saliva as low (pH ≤4), intermediate (pH 4.5–5.5), or high (pH ≥6) buffer capacity.

Data obtained from baseline, after two weeks and two weeks of washout period were arranged and tabulated and statistically analysed using the software SPSS version 21.0. The levels of statistical significance is set at p≤0.05. Repeated measures of ANOVA is used to investigate the effects of the probiotic consumption on *S.mutans* levels in saliva and salivary pH .Correlation was calculated between sugar exposure and *S.mutans* levels using Spearman correlation.

### RESULTS

The study revealed that there was significant reduction of salivary *S. mutans* levels after intervention period(Figure 2),but after washout period there was no significant difference or decline in the *S. mutans* levels (Table I,).



**Figure 2: The culture plates reveals considerable decrease in S. Mutans levels after the intervention period**

**Table I: Comparison of Streptococcus mutans level among the three time frame**

Group	N	Mean	Standard Deviation	F- value	p- value
SM-T1	12	27.17	21.595	11.8	.006*
SM-T2	12	2.50	1.508		
SM-T3	12	11.75	2.527		

\*significant at the 0.05 level using Repeated measure ANOVA.

There was no significant change in pH at baseline , after intervention and during washout period (Table II).

**Table II: Comparison of pH among the three time frame**

Group	N	Mean	Std. Deviation	F- value	p- value
pH-T1	12	6.08	.515	27.13	.001*
pH-T2	12	6.92	.289		
pH-T3	12	7.00	.000		

Correlation coefficient suggest a negative relationship between mean sugar exposure and SM count(Table III).

**Table III: Correlation of Streptococcus mutans and Sugar level**

		S. Mutans (T1)	S. Mutans (T2)
Sugar Exposure	Correlation coefficient	-.227	-.007
	Sig. (2-tailed)	.502	.983
	N	12	12

**DISCUSSION**

Probiotics are earning wide acceptance in the field of oral health care. Some of the lactobacilli strains are considered to have omnipotent antimicrobial activity.<sup>9</sup> Yakult the probiotic drink was selected in the study as it has 75 year’s history of safe consumption, proven health benefits, extensive scientific research, reduction of functional and infectious gut diseases and immune-modulating effect.<sup>12-15</sup> The study revealed that there was significant reduction of salivary *S. mutans* count after study period of two weeks. The mean of *Streptococcus mutans* count has significantly decreased from 27.17 to 2.50. The reason may be as the probiotics are exposed to oral cavity might undergo saliva mediated aggregation.<sup>16-19</sup> They compete and intervene with bacterial attachments and produce antimicrobial compounds such as organic acids, hydrogen peroxide, carbon peroxide, diacetyl, low molecular weight antimicrobial substances, bacteriocins and adhesion inhibitors.<sup>20,21</sup> Studies done by *Bezkorovainy* 2001<sup>22</sup> had proved that a probiotic strain cannot anticipate a long term effect on the host after cessation of intake. In this study two weeks use of a *Lactobacillus casei* enriched Yakult drink showed a reduced *S. mutans* count in the oral cavity but after discontinuation for two weeks the *S. mutans* count increased. This showed transient colonization of probiotic species.

Dental caries is a diet related disease. Sweet consumption especially between meals may lead to

continuous decrease of pH and will not facilitate the pH to return to normal causing demineralization of teeth. Dental caries results from the interaction between pH, mineral flux and solubility at tooth surface.<sup>2</sup> According to Enamel Sieve Concept<sup>23</sup>, after sugar consumption there will be an increase in hydrogen ions in dental plaque causing an increase in pressure gradients, leading to dissolution of hydroxyapatite crystals to their ionic components. These ions will diffuse towards dental plaque leaving behind microspaces. By the increase of pH due to the action of buffer system and termination of carbohydrate, a remineralization episode will be initiated, calcium, phosphorous ions and others will diffuse back to enamel from dental plaque. The precipitations of ions will be in form of a variety of complex salt crystals. In a succession of demineralization and remineralization cycle, if the sum of the demineralization is greater than the remineralization there will be a continuous loss of minerals thus porosity then cavitation finally causing dental caries.<sup>23</sup> In this study, diet chart was maintained to evaluate caries risk associated with sugar exposure. Correlation coefficient suggest a negative relationship between mean sugar exposure and *S. mutans* count. People who have high dietary sugar exposure can also control the oral microbiome with regular usage of probiotic with no significant variation in the salivary pH.

The pH of saliva found to be improved during the course of the study. The mean of pH at baseline, after two weeks of intervention and after washout period were 6.08, 6.92 and 7.00 respectively. In the present study no variation in salivary pH during the consumption of probiotic drink and washout period. The buffering capacity of saliva may get exhausted by the ongoing production of organic acids by cariogenic bacteria in the mouth. An improved pH results in the release of calcium and phosphate ions, which act to inhibit demineralisation due to the localised increased degree of saturation of milk proteins at the tooth surface and might promote remineralisation.<sup>24</sup> When probiotics are consumed as a milk product, buffer capacity of milk will decrease the production of acid. Calcium rich compounds in the

milk are anticariogenic and reduces the colonization of streptococcus mutans.<sup>10</sup>The rise in the pH of saliva in the subjects at the two weeks and washout period could be due to patient awareness. As a result the microorganisms would produce less acid from dietary carbohydrates and the buffering capacity of saliva would have been improved. Future studies should be done with larger sample size for a longer duration to prove the results of the present study.

## CONCLUSION

Within the limitations, the present study concluded

1. Probiotics when used as a regular drink reduces the *Streptococcus Mutans* count in the oral cavity and can be regarded as a caries control method.
2. It exhibits transient colonisation and therefore lacks substantivity. Sustainability of probiotic drink should be studied and justified.
3. People who have high sugar exposure can also control the oral microbiome with regular usage of probiotic with no significant variation in the salivary pH.

**Conflict of Interest:** Nil

**Source of Funding:** Nil

**Ethical Clearance:** From IEC, MCOODS, Mangalore

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# Health Expectancy Under Dynamic Set Up for India and its Selected States

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## ABSTRACT

The quality of life is usually measured in terms of Health expectancy. It is vital to know that weather an increased in a life expectancy lead to a similar increase in years spent in reasonable health. Further, increases in life expectancy due to the gradual decline in mortality lead to the concept of dynamic life table. In this context, this paper proposes a new method to measure the healthy life expectancy under dynamic approach and consequently access the pattern of changing mortality scenario, resulting in a longer life with good health. In other words, the dynamic healthy life expectancy is the aggregate average number of years that a person lives in a healthy state with continuous changing mortality scenario. The usefulness of the proposed indicator is demonstrated for India and some of its major states for the year 2011. The result showed that, for both sexes, the health life expectancies at birth were more under dynamic consideration as compared to usual consideration.

**Keywords:** *Healthy expectancy, Dynamic, India.*

## INTRODUCTION

The life expectancy is the most widely used measure of health, although it only takes into account the length of people's life and not their quality of life. In almost all the world, improvements in health care, development in medical technologies and also improvement in sanitation facilities are enabling people to live longer <sup>[1]</sup>. As people live longer and mortality rates have been declining, several health related questions arises about the quality of years lived. To answer these questions efforts have been made to develop a summary measure of population health that takes into account both current mortality and morbidity levels of a population. This concept is well known as health expectancy. More specifically, health expectancy is defined as the number of remaining years at a particular age that an individual can expect to live in a healthy state (howsoever way health may be defined) if current mortality and morbidity prevails <sup>[2],[3]</sup>. In most of the countries, today, health expectancy has been used as the central summary indicator of population health status<sup>[4]</sup>.

Further, in a period life table the assumption of a constant mortality rates prevails over the years and does not allow for the changes in mortality probabilities. However, the past records in both developed and developing countries showed a gradual decline in

mortality and a continuous increase in life expectancies <sup>[5]</sup>. In such case, an extension of the period life table has been proposed by Denton and Spencer (2011) which would explicitly allow for the possibility of further changes in mortality. This extension has been named as 'dynamic' extension of the period table that draws out the implications, for survivorship and life expectancy, of observed rates of change of death <sup>[6]</sup>. The concept of dynamic life table is also extensively used in the context of Indian data by Sharma et al., (2017) to demonstrate a more accurate picture of the mortality scenario.

Health expectancy is preferred to life expectancy as an indicator for population health status because it is based not just on mortality, but also on morbidity <sup>[8]</sup>. Moreover, the continuous changes in mortality, in a developing country like India, are largely the resultant of improved health care facilities and medical advances. Since the expected changes in mortality over time can be examined by using dynamic life table. Similarly, one might be of keen interest to calculate the health expectancy when both the mortality and morbidity are likely to change over time. Thus, in the present paper we try to develop an indicator, namely, dynamic health expectancy which would reflect the affects of improving morbidity on mortality.

As mortality rates have been gradually declining, one of the factors for this decline is the improvement of healthiness of the people. As such, if we compute dynamic health expectancy by considering simultaneous changes in mortality and morbidity then the resultant indicator would expect to give an absurd value, which might not be acceptable in real situation. So to compute dynamic health expectancy one can consider only the changing mortality scenario prevailing in a population and the current level of morbidity will prevail. An application of the said indicator is then illustrated for India and some of its major states for the years 2011 based on the previous ten years of change in mortality, which is 2001.

**Development of Health Expectancy under Dynamic**

**Set up:** The estimation of health expectancy or disability free life expectancy, developed by Sullivan (1971), combines both mortality and morbidity rates of a population into a single summary measure. Using Sullivan method, we further developed an indicator namely dynamic health expectancy, which requires combining the dynamic life table with the observed age specific proportions of persons without any disease or disability. As such to develop health expectancy under dynamic set up, we first construct the dynamic life table by the method as given by Denton and Spencer (2011). Here, two period life tables which are t years apart are taken and then the annual rate of change of probabilities of death for any age group x to x + n is calculated by-

$${}_n r_x = \left( \frac{{}_n q_x / -}{{}_n q_x} \right)^{1/t} - 1$$

where,  ${}_n q_x$  is the probability of death for the age group x to x + n in the reference period table (in our context 2011 will be the reference period) and  ${}_n \bar{q}_x$  is the corresponding probability in the earlier period table (2001).

The cohort of the reference period is given by  $l_{xx}$  and  $l_{xy}$  is the population of initial age group x to x + n that survived to the age group y to y + n. The probability that a member of the  $l_{xx}$  cohort who has survived upto the exact age y will die in the interval y to y + n is-

$${}_n q_{xy} = {}_n q_y (1 + {}_n r_y)^{y-x}$$

where,  ${}_n q_y$  is the probability of death in the age group y to y + n in the reference period,  ${}_n r_y$  is the annual rate of change of that probability, and y – x is the number of years between the subsequent age and initial age group, hence the number of years over which the age y probability has changed<sup>[6]</sup>. After obtaining the dynamic probabilities of death, the rest of the columns of the life table are calculated in the same manner as a period life table.

Now, to derive the required expression of health expectancy under dynamic consideration ( $he_{xx}^0$ ), we divide the sum of the products of  $L_{xy}$  and  $(1 - \pi_x)$ , where  $\pi_x$  is defined as the proportion of population with bad health at age x by  $l_{xx}$ . Thus, we get the following expression of dynamic health expectancy

$$he_{xx}^0 = \frac{\sum L_{xy} \cdot (1 - \pi_x)}{l_{xx}}$$

**Application:** As stated in earlier, here we shall try to construct dynamic healthy life expectancy for India and some of its major states. These will be done for the period 2011 taking 2001 as base. For constructing dynamic life tables, the Sample Registration System (SRS) based abridged life tables for the period 1999-2003 and 2009-2013 are taken, which are centered at 2001 and 2011 respectively. Now for the factor health we do not have age specific morbidity data for India, but Census of India published data on disability by their types, age groups and sex for all areas at India, state, district and city level. Different types of disability are ‘in seeing’, ‘in hearing’, ‘in speech’, ‘in movement’, ‘mental retardness’, ‘mental illness’, ‘multiple disability’ and ‘any others’. For our present purpose we can take add up values, that is, total person with disability from 2001 and 2011 censuses. As the data are given for 10 year age group, mostly after age 9, we transform them to 5 year age group by using Karup King formula. Accordingly, the proportions of disability free persons are calculated for each census year under consideration. Then, we calculate the proportions of healthy (disability free) life expectancy under dynamic consideration for 2011 taking 2001 as base by the expression given earlier. A comparison can be made between the health expectancies under dynamic and usual consideration for India and its major states which are presented in table 1 for both males and females.



**Table 1: Dynamic Health Expectancy at Birth with the Corresponding Health Expectancy for India and the Selected States, for both Males and Females, 2011**

	Males		Females	
	DHE(at birth)	HE(at birth)	DHE(at birth)	HE(at birth)
India	68.2	63.2	72.9	66.2
Assam	63.6	60.2	69.0	62.5
Kerala	74.6	68.8	79.1	74.0
Maharashtra	73.5	66.1	75.8	70.1
Punjab	66.6	65.6	72.5	69.7
Rajasthan	63.5	62.3	68.4	65.3
Uttar Pradesh	59.3	60.3	67.7	62.8
West-Bengal	69.9	65.8	73.1	68.5

It is found from table 1 that an Indian male (female) lived on an average of 68.2 (72.9) years in a healthy state for the year 2011, when the mortality rates changes over the previous 10 years. The corresponding value under usual consideration for males was 63.2 years and that for females was 66.2 years, exhibiting a difference of almost 5.0 and 6.7 years respectively with the dynamic health expectancy. This clearly indicates that the health expectancies obtained under dynamic set up are relatively higher than those obtained under usual procedure, which could also be observed for all the selected states under consideration. Among the males of the selected states, the highest dynamic health expectancy at birth prevailed in the state Kerala with 74.6 years while Uttar Pradesh occupied the lowest position with 59.3 years. Also in the case of females, the state with highest dynamic health expectancy is Kerala (79.1 years) and the lowest is Uttar Pradesh (67.7 years). Similar situation is also observed under usual procedure, where Kerala's performance is better in terms of health expectancy at birth (68.8 years for males and 74.0 years for females) and the poorest value is exhibited in the state Uttar Pradesh with 60.3 years for males and 62.8 years for females. Although it is observed that the dynamic health expectancies were higher than the usual health expectancies for both sexes of the states, the exceptional case being the males of Uttar Pradesh where there the dynamic health expectancy is slightly lower than usual health expectancy. This may be attributable to the fact that there was an increase in mortality among older people in Uttar Pradesh over the past ten years. It is noteworthy to mention that after Kerala only the states Maharashtra (73.5 years for males and 75.8 years for females) and West Bengal (69.9 years for males and 73.1 years for females) had scored above the national level in terms of health expectancy under

dynamic approach. On the contrary, Assam, Punjab, Rajasthan and Uttar Pradesh are the states where the dynamic health expectancies at birth are more or less below the national average for both males and females.

In the above table, the variations among the males and females are clearly visible in health expectancies under both dynamic and usual consideration. The situation of females in terms of health was far better than their male counterpart in India and all the selected states. It is observed that the increase in health expectancy under dynamic scenario is higher for females than the corresponding increase in health expectancy for males. This also indicates that there has been a significant increase in life expectancy for females, where the improvements in overall mortality especially among adults have largely contributed to the increase in life expectancy at birth in females as compared to males<sup>[7]</sup>. In addition to this, at all India level as well as disaggregated by various social groups, the proportion of disabled in the corresponding population is higher for males than females<sup>[11]</sup>, thus resulted in the higher values of dynamic health expectancies for females.

## CONCLUSION

In the present paper, we try to propose an index of life expectancy incorporating mortality along with health status of a population under dynamic set up. When the proposed index was applied to the Indian data for both males and females for the year 2011 taking 2001 as base, a significant difference has been observed between the health expectancy at birth under usual and dynamic approach. The analysis showed that among the states under consideration, Kerala performs exceptionally well

in terms of health expectancy, followed by Maharashtra and West Bengal. These states have also higher differences between dynamic and usual health expectancy at birth as compared to other states. This reveals that the health situation of these states along with the life expectancy have remarkably improved over the past 10 years. Though there has been a gradual reduction in mortality in all the states of India together with an improvement of health status of the people, the states like Assam, Uttar Pradesh and Rajasthan were still lagging behind with respect to the health expectancy. Thus, we hope that the findings of the study will help the policy makers to take the necessary steps in improving the health scenario of the people to live a longer life with quality.

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**Ethical Clearance:** The data used in the present paper was secondary, so the case of *Ethical Clearance* may not arise.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# IoT based E-Critical Care Unit for Patients In-Transit

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## ABSTRACT

Quite often, we see patients dying due to non-availability of doctor on site or because the person on site is not authorized to administer any drug without the recommendation of a qualified doctor. Therefore, to get a doctor's prescription, either the doctor is called telephonically or the readings of the vital sign monitor, installed (if any) in ambulances, are described to the doctor by the person attending on the patient. The drawback of telephonic communication is that the doctor cannot actually see the monitor and he has to rely on the attendant for the information and further for administering the drug. In such cases, the patient may suffer due to communication errors between the doctor and the attendant. As such, there is a need for smart and secure technology which can enable quick and easy virtual access of doctor to the patient in real time. The present paper reports on the development of a fully integrated system, i.e. Smart and Portable Intensive Care Unit (SPICU) that would provide a REAL TIME ACCESS of the vital parameters of a patient to the concerned doctor at a remote location, in an easy and convenient manner i.e. on his Smart Phone. In turn, the doctor can easily monitor Vital Signs of the patient in real time and inject life-saving medicines at required time duration from a remote location. In this paper the working model of a low-cost multi-syringe infusion pump is described. The reported infusion pump would enable a doctor to deliver drug(s) from remote location. The obtained results pave a way towards the development of a low cost portable drug delivery system that can be installed in ambulances/ICU/CCU and to transfer the vital parameters of the patient to the doctor.

**Keywords:** *Telemonitoring, cloud computing, remote health monitoring*

## INTRODUCTION

Remote monitoring of patients, including vital signs, audio and video is becoming necessary, especially when a patient is in transit. By transmitting the vital parameters of the patient to a doctor reduces the time for initiating treatment and allows the emergency crew to be better prepared<sup>(1)</sup>. In recent years, there has been massive research in ICT (Information and Communication Technology), particularly in the area of Wireless Sensor Network (WSN). Low power microcontroller may

create the backbone of a remote healthcare system, which enables delivering high-quality resource-optimal care "anytime anywhere"<sup>(2)</sup>. Telecommunication system allows us to deliver audio, video, text data and both way communication at high speed data rate. In case of critical situation/emergency/road accidents emergency transportation, real time diagnosis provides precise decision making parameters during the critical minutes while transporting to the hospital. This can increase the possibilities of survival<sup>(3)</sup>. Thus, transmitting the vital parameter of the patient well on time may help out emergency staff in hospitals in a well prepared manner even before the patient gets shifted to the hospital through the ambulance. Such type of technology will help both the patient and healthcare professionals to interact as and when required. The scope of this study is to design a portable and smart drug delivery system that can transmit the vital parameters of the patient and provide the virtual presence of the doctor inside an ambulance in emergency cases.

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## OVERVIEW OF EXISTING DRUG DELIVERY SYSTEM

Literature review has been conducted using the terms: Remote Drug Delivery, Telemonitoring, Distant Monitoring and Vital Sign Monitoring. Mobile phones are used to provide many facilities; therefore, multiple mobile applications are available today. Further development in this era allow mobile devices to fetch physiological and environmental parameters to enhance quality of life and remote monitoring<sup>(4)</sup>. It is possible now to collect, distribute and process bedside data of a patient in real time<sup>(5)</sup>. Immense research work has been done to transmit the patient data to a doctor in hospital or medical centre remotely. Where a doctor can monitor or analyse the patient data and take suitable action. An IoT (Internet of Things) based solution is proposed by<sup>(6)</sup> using Wireless Body Area Network (WBAN) to store patient data to health care record database. Telemonitoring shows a great potential to improve the health of patients suffering from diabetes and chronic heart failure<sup>(7)</sup>. In telemonitoring cardiopulmonary diseases and chronic heart failure are the most common applications. Tele-monitoring is a remote monitoring system that includes the usage of audio, video and IoT technology to monitor the status of a patient<sup>(1)</sup>. Apart from telemonitoring, Cloud Computing proves to be helpful for the development of Healthcare systems. It is the best solution with cheap cost, flexibility, better quality of service as well as scalability<sup>(8)</sup>. Moreover, advancement in the era of distributed computing, cloud computing and advanced processors allowed researchers to manage and process with unstructured data<sup>(9)</sup>. The key element of the present invention is bi-directional communication between doctor and patient. This study would allow a

doctor to prescribe the drug from remote location after viewing the physiological data of the patient. This is especially important for the monitoring of critically ill patients in transit or in hospitals.

## MATERIALS AND METHOD

Healthcare support system is an important sector which needs to be handled carefully by the government for improving the health of the citizens. Cloud computing is found to be very effective through the continuous monitoring of the patients. Along with cloud computing architecture, wearable sensor technique as well as radio frequency identification device is also found to be efficient. Sometimes, the combination of cloud computing and wireless body area network is also efficient in monitoring of the patients<sup>(10)</sup>. The main objective of this paper is to enable health care professionals to assess vital parameters of the patient to facilitate drug delivery. The present invention provides a fully unified system to doctor with REAL TIME ACCESS to the vital parameters of a patient from a remote location. The doctor can view the selected vital parameters of the patient on his Smartphone in real time, and also can control the release of medicine to the patient from a remote location or during the transition in an easy manner. For our study, we have used a five parameter Vital Sign Monitor (VSM), which is connected with the patient, to store and display the vital signs. The working model of the proposed system is shown in the figure-1. Vital sign monitor transmits the vital parameters of the patient to the interface application hosted on Raspberry-pi microcontroller. This application further pushes the vital parameters to the cloud in JSON (Java Script Object Notation) format, which are further displayed on the mobile phone of the doctor using android application.

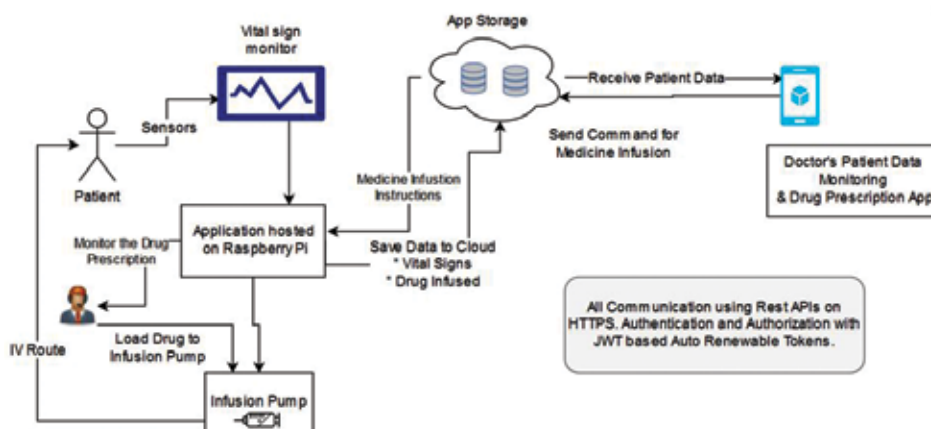


Figure 1: Working model

We have also designed an Android application which will enable doctors to receive the patient's physiological data after the successful authentications. In clinical practice it is necessary to secure the patient data to maintain the privacy. Therefore, It is essential to provide end to end security, confidentiality and integrity of patient data while the information is processed, stored and shared. The authentication and authorization are based upon JWT (JSON Web Token) auto renewable tokens. After seeing the vital parameters of the patient the doctor can suggest and prescribe the drug to the medical staff in the ambulance. Information like syringe number, the amount of the drug to be infused, syringe motion is sent in the form of a secure packet to the cloud as shown in figure-2. This packet is further received by the interface.

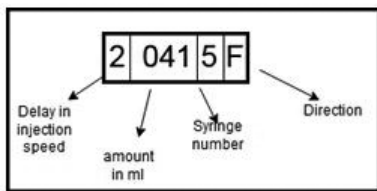


Figure 2: Packet information for cloud

The operator receives a signal and fills the syringe as per the drug prescribed by the doctor and the interface application sends a command to the infusion pump. The three layer architecture for the patient monitoring is shown in figure-3. The middle layer consists of two applications (user interface and android), which interacts with the hardware and cloud layer respectively. The user interface is hosted on the raspberry pi controller which acts as a middleware between top and bottom layer.

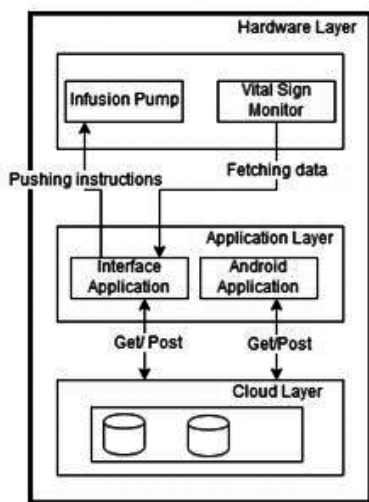


Figure 3: Three layer architecture model for patient monitoring

## FINDINGS

Patient safety is one of the important challenges which is faced by healthcare professionals worldwide. The medication errors are increasing due to wrong infusion/drug, workload of the nursing staff, lack of mathematical skills/ pharmacological knowledge<sup>(13)(14)(15)</sup><sup>(16)</sup>. Therefore, with a computer controlled drug delivery system we can reduce the adverse effects due to drug. As shown if figure-3 user interacts with the application layer. At the application layer we have developed user interface in python programming language to fetch the vital parameters of the patients from the sensors connected with the vital sign monitor. For our study, we have used data set provided by<sup>(17)</sup>, who provided vital sign data recorded from patients undergoing anaesthesia at the Royal Adelaide Hospital. We have also developed an android application which will help the doctors to fetch the patient data using an android phone. The sensors are installed in the infusion pump to detect the status of a syringe (installed, empty and filled). Figure-4 shows the mechanical control of infusion pump that uses a lead screw to position the plunger and to manage the liquid movement. This whole process is controlled by a stepper motor which moves the syringe plunger. Microcontroller attached with the stepper motor generates the pulses to control the direction of the motor. Formula to generate the pulses is derived to control the speed of motor.

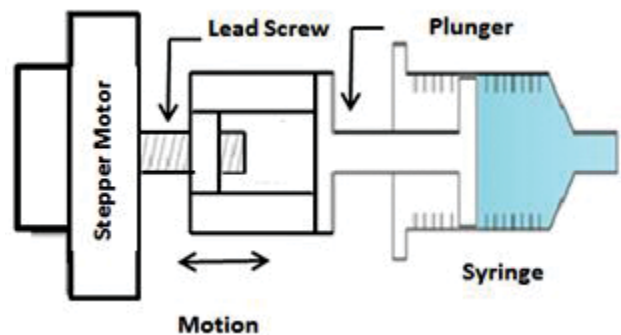


Figure 4: Mechanical Control of Infusion Pump

**Pulse Generation Formula:** To perform the whole experiment different parameters are taken into consideration. Supposing  $f$  is the frequency,  $T_d$  is the time delay for the generation of frequency,  $T_s$  is the time taken,  $q$  is the quantity of drug to be dispensed,  $x$  is taken as a constant. Since frequency cannot be controlled so we control  $T_d$ . As  $T_d$  is inversely proportional to frequency so  $f \propto \frac{1}{T_d}$

Therefore, as  $Td$  increased the speed decreases, this helps in maintaining the precision of the device.

$$Td \propto Ts$$

$$Td \propto \frac{1}{q}$$

$$Td = \frac{Ts}{(q * x)}$$

$$x = \frac{Ts}{Td * q}$$

Therefore, from the above calculation value of constant  $x$  can be determined, i.e.  $x = .00324$

$$Td = \frac{Ts}{q * 0.00324}$$

Thus, in order to make the device work properly the quantity of the drug to be delivered and the time for drug delivery should be provided to the system which will produce time delay and in turn provides pulses to the controller. The syringe sensors, which are installed with the pump help to detect the status of a syringe. The syringe sensor reads the status of syringe before the start of infusion e.g. if the syringe is not installed by the user, it will not start the infusion. The syringe sensor available at the pump can also detect if the syringe is empty and thus can immediately stop the infusion. A switch is also installed on the infusion pump which is to be pressed by the operator if command for the infusion is received at the pump.

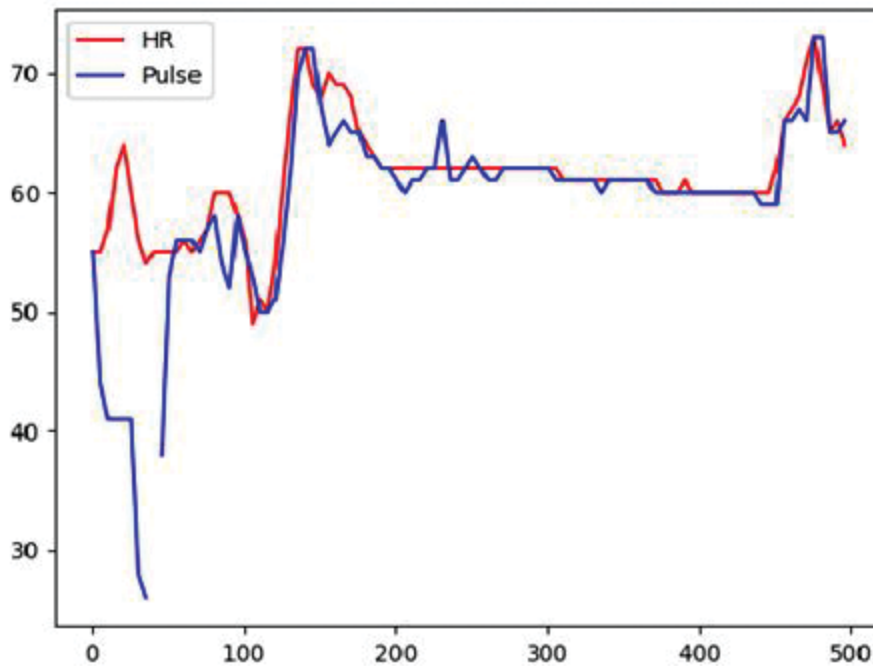


Figure 5: Vital sign transmission of the Smart Phone

### CONCLUSION

The present invention discloses a cloud computing based interface that involves a remote access diagnostic unit to monitor the patient from a remote location. With respect to the remote monitoring of a patient from the remote location, many researchers have demonstrated the transmission of the physiological data of the patient in real time. The proposed model is not only helping a doctor to view the vital parameters, but also facilitates a doctor to prescribe name, rate and amount of the drug. Portability is one of the important features of the model which enables to install the system from one

place to another place. Therefore, it can be installed in ambulances so as to provide virtual presence of the doctor inside the ambulance.

**Financial Support and sponsorship:** The proposed model (Smart Portable Intensive Care Unit) is awarded and funded by Millennium Alliance (MA) at stage-1.

**Conflict of Interest:** There are no conflicts of interests.

**Ethical Clearance:** This project is sanctioned by Millenium Alliance, Govt. of India, USAID, UKAID, World Bank. Testing phase is undergoing.

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# The Influence of Moderate Intensity Exercises on Fatigue and Quality of Life in Cancer Patients Undergoing Chemotherapy

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## ABSTRACT

**Background:** Fatigue and decrease in quality of life are the common symptoms experienced by the patients going undergoing chemotherapy. The role of exercises and individuals adherence to exercise helps in reducing fatigue, improves quality of life and reduces exertion. So the following study was carried out.

### Objectives:

1. To determine the effect of moderate intensity exercises on fatigue in cancer patients undergoing chemotherapy
2. To determine the effect of moderate intensity exercises on quality of life in cancer patients undergoing chemotherapy.
3. To determine the effect of moderate intensity exercise on perceived exertion in cancer patients undergoing chemotherapy.

**Method:** 60 subjects having cancer which were going under chemotherapy are selected. The pre and post assessment is taken by using by using VAFS, PFS, BORG SCALE and SF-36 score. They were divided into two groups i.e, Graoup A and Group B, group A was given moderate intensity exercises and other group i.e B group was control group.

**Result:** Moderate intensity exercises i.e, Group A showed significant improvement in level of fatigue and quality of life when compared to the control treatment.

**Conclusion:** Moderate intensity exercises shows significant effect on level of fatigue, quality of life and perceived exertion

**Keywords:** Cancer, Chemotherapy, moderate intensity exercises, fatigue, quality of life.

## INTRODUCTION

Any treatment of cancer such as surgery, chemotherapy, radiotherapy, hormone replacement therapies and targeted therapies all of them have many adverse effects<sup>1</sup> such as pain, decreased appetite, ulcers in mouth, hair-loss, nausea and vomiting, shortness of

breath and fatigue<sup>2</sup> and it also leads to loss of sleep, altered hormonal level in breast cancer individual's depression anxiety<sup>3</sup>. Fatigue is the first and most commonly experienced symptom by the individual<sup>5</sup>. Around 80%-100% of cancer individuals experiences fatigue symptom<sup>5</sup>. National Comprehensive Cancer Network defines cancer related fatigue as "a persistent, subjective sense of tiredness related to cancer or cancer treatment that interferes with usual functioning"<sup>6</sup>. And treatment like radiotherapy and chemotherapy worsens the feeling of fatigue. And later this fatigue symptom may lead to exhaustion and complete loss of energy<sup>4</sup>.

Exercise is important in preventing cancer and also gives impact on individuals with cancer. Every

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individual consistently report improvement in quality of life with the help exercise. And the drugs which are used for fatigue in cancer patients have not given good results<sup>7</sup> Li Tian et.al studied the effect of aerobic on cancer related fatigue, and aerobic exercises are the exercise of low to moderate intensity exercises which, results showed that aerobic exercises were effective in the patient with cancer related fatigue<sup>8</sup>. In cancer individuals there is loss of weight around 25% and 75% loss of skeletal mass<sup>9</sup>. It is also suggested that resistance training in cancer individuals help in improving muscle strength and it can be also used to overcome the other adverse effect of cancer treatment<sup>9</sup>. Exercise can also add beneficial effect on mental health. It is also suggested that exercises has marked effect in reducing depression and anxiety and to improve the mental health<sup>10</sup> There are very few studies which had seen the effect of exercises on various types of cancer<sup>11</sup> So this study was carried out

## MATERIALS AND METHODOLOGY AND PROCEDURE

The inclusion criteria was both male and female of 20-55 years of age group having cancer and which

### 1. VAFS

**Table 1: Comparison of pre and post VAFS score within the group**

	PRE	POST	P VALUE	T VALUE	INFERENCE
GROUP A	7.33 ± 1.32	3.40 ± 1.35	P < 0.0001	14.750	Extremely significant
GROUP B	7.73 ± 1.20	6.66 ± 1.64	P < 0.0001	4.750	Extremely significant

In the Group A, the P value by paired t-test (14.750) was found to be <0.0001 which was extremely significant. In Group B, the P value by paired t-test found to be <0.0001 and t value which was 4.750 extremely significant.

### 2. LEVEL OF FATIGUE BY PFS:

**Table No.2: Comparison of pre and post PFS score within the group**

	PRE	POST	P VALUE	T VALUE	INFERENCE
GROUP A	7.62 ± 0.72	4.18 ± 0.62	P < 0.0001	24.087	Extremely significant
GROUP B	7.81 ± 0.67	7.22 ± 0.74	P < 0.0003	4.169	Extremely significant

In the Group A, The P value by paired t-test was found to be <0.0001 and t value was 12.034 which was extremely significant. In Group B, the P value by paired t test was found to be <0.0003 and t value was 4.169 which was extremely significant. ±

### 3. BORG SCALE

**Table No. 3: Comparison of pre and post BORG SCALE score within the group**

	PRE INTERVENTION	POST INTERVENTION	P VALUE	T VALUE	INFERENCE
GROUP A	13.26 ± 1.87	6.76 ± 1.04	P < 0.0001	18.32	Extremely significant
GROUP B	12.2 ± 2.07	8.16 ± 0.98	P < 0.0001	5.352	Extremely significant

have gone under chemotherapy and who were willing to participate was taken. Patients with psychological illness, oral cancer and traumatic injuries were excluded.

The control sample of 30 subjects was studied in this experimental study. These subjects were divided into 2 groups. Group A was experimental group with the mean age of 41.93±8.50 while the group B was an control group with a mean age of 44.96±7.21. Group A had a moderate intensity exercises protocol like warm up exercises followed by moderate intensity exercises i.e, static cycle, brisk walking and stair climbing which was followed by cool down exercises. The group B was a control group. They were given treatment of breathing exercises, energy conservative techniques and slow walking.

The pre treatment and post treatment assessment was done by outcome measures like VAFS, PFS, Borg scale and SF-36 questioner.

Data analysis -The statistical analysis of VAFS, PFS, Borg scale and SF-36 scores was done by repeated paired t test and unpaired t test.

In Group A, the P value by paired t test was found to be <0.0001 and t value was 18.32 which was extremely significant. In Group B, the P value by paired t-test found to be <0.0001 and t value was 5.352 which is extremely significant.

4. SF-36

**Table No. 4: Comparison of pre and post SF 36 score within the group**

	PRE INTERVENTION	POST INTERVENTION	P VALUE	T VALUE	INFERENCE
GROUP A	23.18 ± 4.32	75.16 ± 7.16	P <0.0001	59.72	Extremely significant
GROUP B	23.07 ± 4.04	43.68 ± 6.15	P < 0.0001	17.13	Extremely significant

In Group A, the P value by paired t test was found to be <0.0001 and t value was 59.72 which was extremely significant. In Group B, the P value by paired t-test found to be <0.0001 and t value was 17.13 which is extremely significant.

**RESULT**

Moderate intensity exercises i.e, Group A showed significant improvement in level of fatigue and quality of life when compared to the control treatment.

**DISCUSSION**

Moderate intensity exercises has positive affect on the individual in all the aspects. The purpose of present study was to find out effect of Moderate intensity exercises on individuals with cancer. The feasible training program aims to decrease the fatigue and improve quality of life.

Cancer individuals have low physical endurance, which further reduces physical activity and thus this affects muscle and cardiovascular function and it further leads to fatigue. And this cycle of fatigue can only be broken down by continuous physical activity or adherence to physical activity. And it is also stated that high intensity exercises suppresses immunity and give high chance of infection. Their is no ideal mode of exercise available for cancer individual<sup>12</sup>. It is also said that Supervised exercises improves muscle mass, function and quality of life in individuals with cancer, and their is no proper exercises protocol for cancer adults<sup>13</sup>.

So in this study low intensity and moderate intensity exercises was taken.

According to various studies it was analysed that moderate intensity exercises may help in improving quality of life and fatigue in various immunosuppressed patients. This study aims to reduce fatigue, reduce

exertion and improve quality of life of subjects with immunspression and cancer . In this study treatment protocol was given for 12 weeks.

Advantages of Moderate intensity exercises–

- It helps to improve cardio vascular function.
- It helps in improving physical as well as mental health
- It improve quality of life

In this study, 60 subjects had participated who were diagnosed with Cancer and underwent treatment (Chemotherapy or radiotherapy) out of which 30 were male subjects and 30 were female subjects. The mean age of subjects included in Group A was 41.93 and in Group B was 44.96 .

Subjects were analysed and were divided into two groups according to random sampling method. 30 subjects were included in Group A and were received warm up exercises with moderate intensity exercises and followed by cool down exercises. An education and home exercise booklet was also provided for the reference. The treatment protocol was continued for 12 weeks.

Pre treatment outcome measures for fatigue, quality of life and rate of perceived exertion was done with VAFS,PFS, SF-36 and Borg scale. The specific treatment protocol was followed for 12 weeks.

Intra group comparison (within group) was analysed by paired t-test for VAFS, PFS, BORG SCALE and SF-36 score. This showed that there was extremely significant difference of Group A VAFS score with (P<0.0001). PFS

scores was also extremely significant with ( $P < 0.0001$ ). Borg scale and SF-36 score shows extremely significant difference with ( $P < 0.0001$  and  $P < 0.0001$  respectively).

Similarly, In Group B, there was extremely significant difference of VAFS with ( $P < 0.0001$ ) respectively. PFS score was also extremely significant with ( $P < 0.0003$ ). SF-36 score was also extremely significant with ( $P < 0.0001$ ). Borg scale score was also extremely significant with ( $P < 0.0001$ ).

Inter group comparison (between groups) was analysed statistically using unpaired t-test. This shows that pre intervention VAFS was not statistically significant with ( $P = 0.2250$ ). Pre intervention PFS was not statistically significant with ( $P = 0.2876$ ). Borg scale score with ( $P > 0.9999$ ) was not significant and SF 36 Score was also not significant with ( $P = 0.9249$ ). While comparing the post intervention values of VAFS on rest was extremely significant with ( $P < 0.0001$ ). PFS was also statistically significant with ( $P < 0.0001$ ). SF 36 score was statistically very significant with ( $P < 0.0001$ ). and borg scale was also statistically significant with ( $P < 0.0001$ )

In this study, an attempt was made to reduce fatigue and exertion and improve quality of life.

Improvement of subject on week 12 i.e. after the treatment program gets over.

- The subject could perform exercise independently
- There could be improvement in quality of life of subjects with Cancer or who underwent chemotherapy/radiotherapy.
- There was reduction of symptoms in both the group but in group A there was marked reduction on symptoms were seen.

In conclusion, the result of current study shows that Moderate intensity exercises is significant. Further studies can be done for longer duration of treatment protocol in order to determine the long term effect of this program.

Moderate intensity is more help full in cancer individuals because people with cancer have reduced physical activity. But exercises helps in improving physiological functioning, it helps in maintain stress on musculoskeletal and cardiovascular function to perform

better. And thus this adherence to exercises adapt them to physical activity<sup>13</sup>.

## CONCLUSION

Different approaches are used in treating fatigue in cancer individuals but this study concluded that the moderate intensity exercises was more effective reducing fatigue, perceived exertion and improves quality of life.

**Conflicts of Interest:** This study can be carried out with more various forms of exercises and large sample size can also be taken into consideration.

**Ethical Clearance:** Ethical clearance was taken from institutional committee of Krishna institute of medical science, deemed University, Karad.

**Source of Funding:** Source of funding is Krishna institute of medical sciences deemed University, Karad.

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# The Effectiveness of Planned Educational Intervention on Knowledge and Skills in Home Care Management among Care Givers of Patients with Spinal Cord Injury

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## ABSTRACT

**Introduction:** The effects of Spinal Cord Injury are variable and may be permanent; there is currently no cure, emphasizing the need for effective management to prevent potential complications. A Pre experimental study was conducted on the effectiveness of planned educational intervention on knowledge and skills in home care management among care givers of patients with spinal cord injury in selected wards, AIMS, Kochi.

**Purpose:** The Objectives of the study were to 1) compare the knowledge of care givers of patients with spinal cord injury before and after the administration of a planned educational intervention, 2) assess the skill of care givers of patients with spinal cord injury after the administration of a planned educational intervention, 3) find the association between the knowledge and skills in home care management among care givers of patients with spinal cord injury and selected demographic variables.

**Materials and Method:** The research approach was quantitative research approach and the research design was pre experimental one group before-after design. The study was done on 30 caregivers of patients with Spinal Cord Injury in selected wards, AIMS, Kochi. The sampling technique used was convenience sampling.

**Results:** The mean pretest knowledge score of care givers of patients with spinal cord injury was 12.20, while mean post test knowledge score was 30. A significant improvement in the post test knowledge scores were noted at 0.001 % level of significance(  $t=34.61$ ). Post test skill score shows 90% of subjects achieved a grade of good in areas like mouth care, skin care, NG tube feeding, and ROM exercise. 93.3% of subjects achieved grade of good in area like catheter care.

**Conclusion:** The study concludes that the planned educational intervention on home care management were effective in improving knowledge and skills of caregivers of patients with spinal cord injury.

**Keywords:** *Spinal cord injury, Care givers, Planned educational Intervention*

## INTRODUCTION

Spinal cord injury is a condition that affects the independence of an individual and makes him dependent on others. The world wide prevalence of spinal cord injury was 223-755 per million and world wide incidence

of spinal cord injury was 60-83 per million.<sup>2</sup> In India, approximately 15,00,000 people live with spinal cord injury. Every year, 10,000 new cases add to this group of individuals. In Kerala, around 18,000 persons suffer from spinal cord injury. Majority of them (82%) were males in the age group of 16-30 years.<sup>3</sup> The causes of spinal cord injuries (SCI) include motor vehicle accidents (44%), acts of violence (24%), falls (22%), sports (two-thirds of these are from diving accidents) (8%), and others (2%).<sup>4</sup>

As a result of recent advances in medical technology, persons surviving a spinal cord injury (SCI) were living longer lives and often require varied degrees of assistance over their life span.<sup>5</sup> In response,

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family members often become the primary sources of assistance for various activities of daily living, such as feeding, dressing, transfers, and bowel and elimination needs.<sup>6</sup> However, caregivers enter into this new role without formal preparation or training.<sup>7</sup>

Considerable research has been conducted on the role of caregivers for older adults with chronic illness, for younger adults and children with brain injury, and for children with other chronic conditions. However, significantly less research is available on this role with regard to Spinal Cord Injury (SCI), which was the focus of this study. The cases of neurotrauma potentially involve the need for very long-term support provision.<sup>8,9</sup> In many cases, spinal cord injuries require substantial physical therapy and rehabilitation, especially if the patient’s injury interferes with activities of daily life<sup>14</sup>. Lower urinary tract symptoms in neurological disease may be at variance with the pattern expected based upon level of neurological lesion<sup>15</sup>.

**MATERIALS AND METHOD**

**Research Design:** The research design used for the study was pre experimental one group pretest- post test design (01 X 02). This design was adopted for the study in order to avoid contamination between groups and to overcome the sample scarcity.

**Sample Size Estimation:** Sample size was calculated by the formula ‘Sample size for paired t test’ at 95% confidence and 80% power. The minimum sample size obtained was 18 and for increasing the generalizability it was finalized as 30.

**Study Population:** Care givers of patients with spinal cord injury who are admitted in the selected wards of AIMS Hospital, Kochi from November 2012 were considered for the study.

**Data Collection Instruments and Techniques**

**Development**

**Tool I**

**Section A:** Sociodemographic data of the caregiver. It contains information related to caregivers such as age, religion, education, occupation, socioeconomic status, marital status and relationship to the client.

**Section B:** clinical data of the client which is filled by the researcher.

**Section C:** Structured questionnaire to assess the knowledge on home care management of care givers of patients with spinal cord injury under 6 dimensions includes general questions related to spinal cord injury and its self care needs, oral care, skin care, nasogastric tube feeding, catheter care and ROM exercises with a total of 35 items. The data was collected by self administered questionnaire.

**Data Collection Procedures:** With prior permission for conducting the study, investigator selected the sample based on sample selection criteria by convenience sampling technique. The investigator established a rapport with the caregivers and obtained informed consent. On Day 1, the demographic data and knowledge on home management of self care needs of the patients were assessed using a structured questionnaire. The tool consisted of 3 parts, part I - demographic data, part II - clinical data and part III - knowledge questionnaire. The caregivers were asked to put a tick mark against the correct answer and the questionnaire was collected back after 40 minutes. On Day 2 and 3, the care givers were subjected to individualized demonstration and return demonstration of procedures such as mouth care, skin care, Ryle’s tube feeding, catheter care and ROM exercise for 1-2 hour daily. From Day 4 to 8, the care givers were doing the learned procedures, were assessed with the help of log book. On the 10<sup>th</sup> and 11<sup>th</sup> day post test assessment was done on skills and after that post test knowledge was assessed.

**Data Analysis:** Demographic data was analyzed using frequencies, percentage, mean, and standard deviation. Significance of the difference between pre test and post test scores was tested by Paired ‘t’ test. Association between knowledge as well as skill score of care givers of patients with spinal cord injury and selected demographic variables was done using oneway ANOVA test.

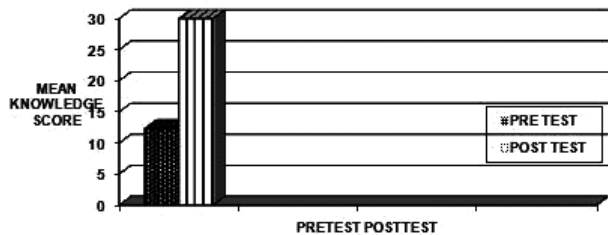
**FINDINGS**

**Table 1: Demographic characteristics of subjects n = 30**

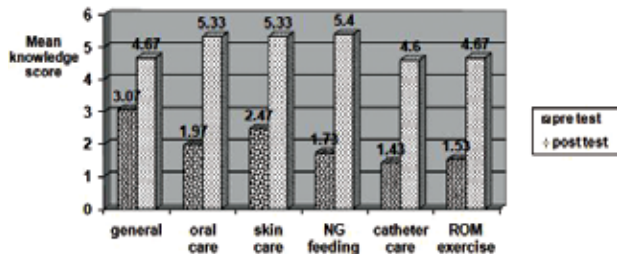
	Sample Characteristics	Frequency	Percentage
<b>1.</b>	<b>Age in years</b>		
	21-30	13	43.3
	31-40	6	20.0
	41-50	8	26.7
	51-60	3	10

Conted...

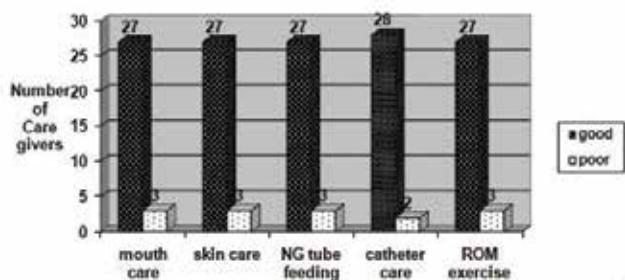
2.	<b>Sex of the care giver</b>		
	Male	3	10
	Female	27	90
3.	<b>Educational status of the care giver</b>		
	Primary	9	30
	Secondary	13	43.3
	Higher secondary	5	16.7
	Graduate	3	10.00



**Figure 1: The mean knowledge score of subjects before and after the planned educational intervention**



**Figure 2: bar diagram showing frequency and percentage of subjects according to knowledge scores**



**Figure 3: Bar diagram showing frequency of grades obtained by subjects in post skill assessment**

The mean and standard deviation of knowledge scores was calculated before and after the administration of planned educational intervention and the mean difference was found. From the present study, it was evident that there was improvement in the knowledge of care givers of patients with spinal cord injury after the administration of a planned rehabilitation intervention

on home management of self care needs. The results suggested that the planned educational intervention on home management of self care needs was highly effective on improving the knowledge of care givers of patients with spinal cord injury.

Among the 30 subjects, it was statistically found that, in the pre test to assess knowledge, 24 (80%) subjects were with poor knowledge, 6 (20%) subjects were with good knowledge. In the post test all 30(100%) subjects were having excellent score.

A similar study conducted by Rundquist J<sup>10</sup> et al (2011) on Nursing bedside education and care management time during inpatient spinal cord injury rehabilitation with the help of practice-based evidence (PBE) research methodology design. Six hundred patients with traumatic SCI were enrolled at six rehabilitation centers such as Craig Hospital, Englewood, CO; Shepherd Center, Atlanta, GA; Rehabilitation Institute of Chicago, Chicago, IL; Carolinas Rehabilitation, Charlotte, NC; The Mount Sinai Medical Center, New York, NY; and National Rehabilitation Hospital, Washington, DC. They depicted the importance of each educational topic. Bladder management was the education topic that comprised the largest proportion of time (17% of total time), next were bowel management and skin (14% each), and medication and pain education (13% each). About 50% of all care management time in all injury groups was spent on psychosocial support of the patient and/or family. In this study they didn't mention the outcome of teaching.

A comparative study was conducted by Chen HY<sup>11</sup> et al in 2004 for the purpose of investigating rehabilitation nurses' care for patients with spinal cord injury. 110 registered nurses selected from two hospitals of UK and two hospitals of Taiwan were the samples. Results show a high percentage of Taiwan nurses (88.9%) promote self care of patients with spinal cord injury through education whereas only 72.5% of UK nurses promote self care. They concentrated on enhancing self esteem.

It was observed that findings of the previous studies run parallel to the present study.

By analyzing mean and standard deviation of skill score computed after the planned educational intervention, it is clear that the score achieved by the subjects are not deviated too much. That is the subjects are able to do the procedures efficiently and they can render an effective home care management for their loved ones.

One group pre- and post-test design study conducted by Yuen HK<sup>12</sup> with the objectives to examine both the short- and long-term effects of an oral home telecare program on improving gingival health among 8 adults with tetraplegia. The oral home telecare program was given using personal computer-based videoconferencing between each participant and an occupational therapist. Training was conducted on an average of five 15-30 min sessions across 3 months. During these training sessions, supervised practice of oral hygiene, and provision of immediate corrective feedback and positive reinforcement in the use of adaptive oral hygiene devices was emphasized. Gingival health assessment using the Löe-Silness gingival index (LSGI) was conducted at baseline, 6 and 12 months. Results showed statistically significant differences (that is, improvement with less gingival inflammation) in their LSGI scores ( $z=2.18$ ,  $P=.03$ ). From baseline to 12 months, participants also showed a statistically significant difference (that is, improvement,  $z=2.03$ ;  $P=0.04$ ) in their LSGI scores.

It was observed that findings of the previous studies run parallel to the present study.

Influence of sex, age, education and occupation in attaining knowledge and skill after the administration of planned rehabilitation intervention were analyzed. The knowledge attained after the administration of planned rehabilitation intervention among the care givers based on age groups found to be non significant at  $p<0.05$  levels which indicated that there was no significant difference in the knowledge attained by the different subjects based on the age.

A cross sectional study conducted by Naveen SR<sup>13</sup> in 2007 for the purpose of assessing quality of life and burden of caregivers of patients with spinal cord injury. In this the caregiver's age distribution shows 10% of caregivers are in the age group 'up to 20', 18% are in the age group 21-30, 36% are in the age group 31-40, 28% are in the age group 41-50, 8% are in the age group 51-60. The caregiver's sex distribution shows 38% of the care givers were male and 62% of the care givers were females. The caregiver's educational status shows 30% were illiterate, 52% were having secondary education, 8% were having higher secondary education and 10% were having education status of degree and above. The caregiver's relationship with patient shows 42% of caregivers were wives, 14% were mothers, 2% were daughters. In the present study out of 30 subjects 13

(43.30 %) were in the age group of 21-30 years. Out of 30 subjects 13 (43.33%) were having educational status up to secondary classes. The relationship of care givers with the patients shows that 20 (66.67%) were wives. The remaining 2 (6.7%) were daughters, 5 (16.7%) were mothers, 3(10.00%) were others.

**Conflict of Interest:** No conflicts among authors

**Source of Funding:** Funding is by self.

**Ethical Clearance:** Ethical clearance was obtained from the institutional ethical committee.

## CONCLUSION

In summary, the planned educational intervention on home care management was effective in improving the knowledge and skill of the care givers of patients with spinal cord injury. Hence this effective planned educational intervention can be implemented as a way of improving the knowledge, skill, and quality of life of the care givers of patients with spinal cord injury as well as patients with spinal cord injury after discharge.

This study will direct and encourage the staff nurses as well as the student nurses to concentrate more on care and education of care givers and patients with spinal cord injury. The study findings can be published in professional journal to assist in disseminating the findings for further testing as well as for possible implementation.

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# Microbiological Evaluation of Polytetrafluoroethylene (PTFE) Tape, Cellulose Sponge and Cotton as Spacer Materials Combined with Intracanal Medicament- An in Vitro Study

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## ABSTRACT

**Aim:** The aim of this study was to evaluate the extent of microbial leakage of cotton, cellulose sponge and polytetrafluoroethylene tape (PTFE) tape used as spacers in an in vitro microbiologic model when impregnated with calcium hydroxide and iodoform based medicaments.

**Materials and Method:** The study consisted of three groups of spacers: Group I: Cotton, Group II: Cellulose sponge and Group III: PTFE tape. The groups were further subdivided into 3 groups where spacers were used alone, impregnated with calcium hydroxide medicament and impregnated with iodoform based medicament. Forty five intact mandibular human premolars were used to check the access cavity bacterial contamination. The teeth were disinfected, pulpal remnants removed, and access cavities were swabbed with sterile cotton. Spacers were placed and the teeth were inoculated with *Staphylococcus aureus* bacteria in nutrient broth till cemento-enamel junction. The access cavities were checked for contamination after 7 days by swabbing with sterile cotton and streaking the agar plates with the same. Bacterial colony formation was observed in all groups.

**Results:** 82% of samples in the cotton spacer group showed colonies  $> 10^5$  CFU/ml, while those impregnated with medicament showed colonies  $< 10^2$  CFU/ml.

**Conclusion:** According to the present study, the effectiveness of the three materials when used with medicament is best in case of cotton followed by cellulose sponge.

While in test groups where no medicament was used, PTFE tape was the most effective and cotton showed least potential against preventing bacterial uptake.

**Clinical significance:** Microbes cause periapical inflammation entering coronally during endodontic treatment. Hence an efficient provisional restoration and an interim spacer material is of paramount importance.

**Keywords:** cotton, PTFE, spacer, endodontics, microbial leakage, provisional restoration, medicaments

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## INTRODUCTION

The success of endodontic therapy between the appointments is often compromised due to coronal leakage through the provisional restorations. Previous studies have demonstrated that the temporary restorative material thickness is a crucial factor in regulating the leakage from oral cavity. Webber et al demonstrated that a minimum thickness of 3.5 mm of Cavit is essential to ensure an adequate seal.<sup>1</sup> In addition to the restorative

material used, the type of spacer used beneath the restoration may also be responsible for the microbial leakage. Study by Vail and Steffel have found that no matter how meticulously the cotton spacers are placed, the fibers may still connect the access chambers with the oral cavity.<sup>2</sup> Traditionally, a layer of cotton in the access chamber is used before temporization by clinicians. It facilitates easy removal of the restoration without damaging the pulpal floor and helps in locating canal orifices.

Newcomb et al reported that the presence of cotton under a temporary restoration provides an opportunity for cotton fibers to be incorporated within the filling leading to bacterial ingress.<sup>3</sup> The disadvantages due to the wicking nature of cotton have led to the use of other materials like foam pellets<sup>3</sup> and PTFE tape<sup>4</sup> as spacers by practitioners. Study by Paranjpe et al confirmed the better performance of PTFE tape than cotton when exposed to contamination.<sup>5</sup> An ease of use, visibility, easy placement and removal, inorganic nature, inertness along with the cost effectiveness and availability are the ideal properties of a spacer.<sup>5</sup> Polytetrafluoroethylene tape or Teflon or Plumber's tape meets these criteria. Its ribbon like, non spongy nature makes it easy to compress, thus reducing the potential for bacterial uptake.

Cellulose sponge made from cellulose wood fibers has also been advocated as spacer material. The use of intracanal medicaments like Calcium hydroxide aid in removal of bacteria, their by products and pulpal remnants from infected root canals.<sup>6</sup> Addition of iodine gives them better reactivity by precipitating proteins and oxidizing essential enzymes.<sup>7</sup> Therefore, the aim of this study was to evaluate the microbial contamination of cotton, PTFE tape and cellulose sponge as spacer materials combined with calcium hydroxide and iodoform based medicaments.

## MATERIALS AND METHOD

**Study Center:** The study was conducted at the Department of Conservative Dentistry and Endodontics, A. B. Shetty Memorial Institute of Dental Sciences and Department of Microbiology, K.S. Hegde Medical Academy, Nitte, Mangaluru.

**Inclusion and Exclusion Criteria:** Forty five human mandibular premolars with intact crowns were used for this study. Previously restored teeth were excluded as

they could permit marginal contamination into the access chambers. Teeth with fracture lines were eliminated to prevent bacterial penetration through fracture margins.

**Procedure:** Tooth surfaces were disinfected with 3 % hydrogen peroxide. A new sterile Endo Access 2 bur ( Dentsply Maillefer) was used and access cavity prepared under rubber dam isolation.<sup>8</sup>

After locating the canal orifices, thorough irrigation of the pulp chambers with 5.25% sodium hypochlorite was carried out followed by irrigation with saline to remove the debris and pulpal remnants. The teeth were autoclaved and pulp chambers swabbed with sterile cotton pellets to eliminate all signs of bacterial contamination that could potentially affect the microbial analysis. The spacer materials, with and without medicament impregnation were divided into groups. Three groups of spacers i.e. cotton, PTFE tape and sponge were formed which were further subdivided into spacers used alone, with calcium hydroxide medicament and with iodoform based medicament.

**TABLE 1: Different Spacer groups**

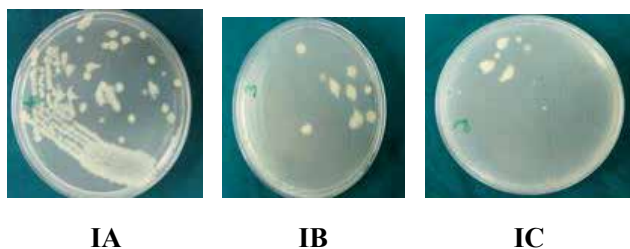
GROUPS	SPACER MATERIALS
<b>Group I Cotton as spacer</b>	
I A	Cotton
II B	Cotton impregnated with calcium hydroxide
III C	Cotton impregnated with iodoform based medicament
<b>Group II Cellulose sponge as spacer</b>	
II A	Sponge
II B	Sponge impregnated with calcium hydroxide
II C	Sponge impregnated with iodoform based medicament
<b>Group III PTFE Tape as spacer</b>	
III A	PTFE Tape
III B	PTFE Tape impregnated with calcium hydroxide
III C	PTFE Tape impregnated with iodoform based medicament

The spacer materials were sterilized prior to insertion and the length of the PTFE tape was standardized to approximately 2 inches. After placement of spacers, a periodontal probe was used to measure the depth of the access chamber. This was done to ensure that it

could accommodate a minimum provisional restorative material thickness of 3.5 – 4 mm (Cavit).<sup>9</sup> Nutrient broth was autoclaved and transferred to 2 ml Eppendorf tubes. The tubes were then incubated at 37 degrees Celsius for 24 hours, followed by bacterial inoculation of broth containing specimens from all spacer groups. The bacterial inoculant used was *Staphylococcus aureus*, a commensal bacterium in the human oral flora<sup>10</sup> which has been used previously in leakage studies.<sup>11</sup> Following the restoration, the tooth samples till the cementoenamel junction were kept exposed in the broth for 7 days. After a week, the external tooth surfaces were disinfected with 70% ethanol, 5.25% sodium hypochlorite and sterile saline. The provisional restoration and spacers were removed. Access cavities were swabbed with sterile cotton pellets, which were then streaked on nutrient agar plates. The agar plates were incubated at 37 degrees Celsius for 48 hours and observed. The bacterial colony growth, measured as colony forming units, were counted and recorded by the microbiologist who was blinded to the study groups and procedures.

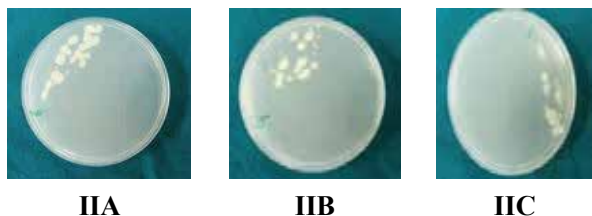
**RESULTS**

The data obtained were statistically analyzed using ANOVA test and Post hoc Tukey’s and Post hoc Scheffe’s test. 82% of samples in Group IA (Cotton) showed colonies > 10<sup>5</sup> CFU/ml, while those impregnated with calcium hydroxide and iodoform based medicament showed colonies < 10<sup>2</sup> CFU/ ml. (Figure 1)

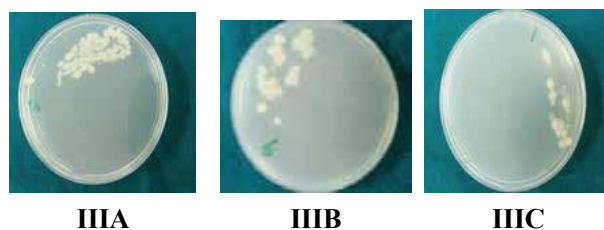


**Figure 1: Total viable count seen when cotton used as spacer**

Also samples in Group I (Cotton) and Group II (Sponge) showed significant difference in the bacterial colony load. (Figure 2) 60 % samples in the PTFE group showed bacterial colonies > 10<sup>4</sup> CFU/ml. (Figure 3)



**Figure 2: Total viable count seen when Cellulose sponge used as spacer**



**Figure 3: Total viable count seen when PTFE Tape used as spacer**

PTFE spacers when impregnated with medicaments had a colony count in the range of 10<sup>3</sup> CFU/ml. (Table 2)

**Table 2: Graph vs Colony Count cross tabulation**

Colony Count (CFU/ml)				
	1-10 <sup>3</sup>	10 <sup>3</sup>	10 <sup>4</sup>	> 10 <sup>4</sup>
<b>Group I (Cotton as spacer)</b>				
Cotton	0	1	0	4
Cotton + Calcium Hydroxide	3	2	0	0
Cotton + Iodoform	4	1	0	0
<b>Group II (Cellulose sponge as spacer)</b>				
Sponge	0	1	1	3
Sponge + Calcium Hydroxide	1	3	1	0
Sponge+ Iodoform	0	4	1	0
<b>Group III (PTFE tape as spacer)</b>				
PTFE Tape	0	1	3	1
PTFE Tape + Calcium hydroxide	0	4	1	0
PTFE + Iodoform	1	3	1	0

**DISCUSSION**

Most endodontists use cotton pellets as spacers above the obturated canals and beneath the temporary restoration.<sup>2</sup> While this is clinically convenient, the fibrous nature of cotton promotes bacterial uptake in the access chamber.<sup>3</sup>

PTFE tape when compressed forms a firm platform which could support the overlying restoration and reduce microbial leakage. Although the use of cellulose sponge was effective in impregnating the medicament, it decreased the thickness of temporary filling as a result of more space consumption in access chamber. Similar results were found by Newcomb et al where the use of cotton as spacers resulted in thin restorations, thus

a poorer seal.<sup>3</sup> The tooth samples were temporized by Cavit as it is used by endodontists routinely and previous studies have shown it to give better results than other materials.<sup>9,12,13</sup> The microbial evaluation showed that spacers were positive for contamination after 7 days. The 7 day time point was selected based on previous *in vivo* and *in vitro* studies.<sup>1,14</sup> The bacterial growth on agar plates showed positive microbial growth in the access chambers. The present study showed that cotton pellets when impregnated with medicament were less favorable to the growth of bacteria. PTFE tape, when impregnated, did not absorb the medicament as efficiently due to its polymeric, non fibrous nature. There was a significant difference between Group I (Cotton) and Group II (Sponge). When saturated with medicaments more adequately, sponge may serve as a better spacer material than PTFE. The use of cellulose sponge has been recommended by some clinicians. However, provisional restorative materials when placed over spongy spacer materials may be more prone to breakdown from masticatory forces. Also, the present study demonstrated that bacterial colony formation was less consistent with iodoform based medicament than with calcium hydroxide.

Another finding of this study is the easy handling characteristics of the PTFE tape and sponge compared to cotton. PTFE has a low static and kinetic coefficient of friction<sup>15</sup>, ensuring a 'non sticky' application and removal without leaving behind residues in access chamber. No simulation of occlusion forces and absence of thermocycling<sup>16</sup> however, are the limitations for this study. Further *in vivo* studies may be required to affirm these results.

### CONCLUSION

When impregnated with medicament, cotton absorbed the maximum and was highly efficient in preventing uptake of bacteria followed by cellulose sponge. PTFE tape due to its polymeric nature did not soak the medicament as adequately and was most available for bacterial ingress. However, when used without a medicament, PTFE tape performed better than cotton and sponge. Addition of iodine to calcium hydroxide medicament provides additional oxidizing antimicrobial action and was more functional in intercepting bacterial contamination. Cellulose sponge and PTFE tape were easy to remove without any signs of bur entrapment and

access cavity residues unlike the fibrous cotton. PTFE tape was found easy to compress and acquired minimum space in the pulp chamber with good support to the overlying restoration. Special care must be excised to compress the spacer in the access chamber to prevent trapping of fibers with the restoration and accommodation of minimum 3.5 mm of provisional restoration.

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**Source of Funding:** Nil

**Ethical Clearance:** Not required

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# Socio-Demographic and Cultural Factors Influencing Treatment Outcomes among Patients with Tuberculosis Attending Tribal Health Care Centers of H. D. Kote Taluk, Mysuru District

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## ABSTRACT

**Introduction:** Tuberculosis has challenged mankind since ages and unfortunately it remains as a global public health challenge even today despite enormous advances in medicine and rapid expansion of health system. India is inhabited by diverse groups of people, with a wide variety of socio-cultural backgrounds which includes the tribal population. Many of the cultural and socio economic factors among tribal population will determine the health care seeking behaviour and treatment outcomes in relation to tuberculosis.

**Objective:** To assess the socio-demographic and cultural factors influencing treatment outcomes among patients with tuberculosis among the tribal population

**Material and Method:** A community based Retrospective and Prospective follow up study was undertaken during February 2014 to October 2014. All the patients attending VMH, Sargur and H.D.Kote govt. hospital who are diagnosed for TB in past three months and those who will be diagnosed for the same in the next 6 months were included for the study. A pretested structured questionnaire was used for data collection. Data collected was entered in Microsoft excel sheet and analyzed by using SPSS-22.0.

**Results:** Jenu kurubas are the highest(68.7%) number of study subjects who made first visit to health facility 3 to 4 weeks after the symptoms appeared. 25% of study subjects were defaulters. Local migration for work (12.5%), Negligence as well as the bad habits of the patient(12.5%) were the factors responsible for defaulting.

**Conclusion:** 25% of the study subjects were defaulters of the DOTS treatment at the end of the study. Local migration for work, alcohol consumption, illiteracy were the factors responsible for defaulting of DOTS treatment. Special attention is to be done to strengthen the network and linkages between the DOTS centres of different places to minimize the effect of migration on treatment outcome.

**Keywords:** Treatment outcome, DOTS, Tribal population

## INTRODUCTION

Tuberculosis remains a worldwide public health problem despite the fact that the causative organism was discovered more than 100 years ago and highly effective drugs and vaccines are available making tuberculosis a preventable and curable disease<sup>1</sup>. The annual risk of tuberculosis infection in high burden countries is estimated to be 0.5-2 per cent. Patient with infectious pulmonary tuberculosis can infect 10-15 persons in a

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year<sup>1</sup>. India is the highest TB burden country in terms of absolute number of incident cases that occur each year. It is estimated that about 1.5 million people died of TB, of these 360,000 were HIV positive and 210,000 MDR-TB cases<sup>2</sup>. High mortality rate among tribal population because of TB clearly suggest the lack of awareness among tribal people regarding the disease. Factors which contribute to the patient’s adherence to treatment and its outcomes are numerous and it is important to identify and address these factors. Research on TB among tribal population is required because of high default rate, increase in number of MDR TB and increased mortality<sup>3</sup>.

**OBJECTIVE**

To assess the socio demographic and cultural factors influencing treatment outcome among patients with tuberculosis of tribal population

**MATERIAL AND METHOD**

A community based Retrospective and Prospective follow up study was carried out during the period February 2014 to October 2014 at Govt. hospital H.D.Kote and VMH, Sargur of H.D.Kote taluq. Approval was obtained from the ethics committee of JSS Medical College, Mysore and VMH, Sargur for conducting the study. Required permission was obtained from the concerned authorities of the hospitals. All the patients attending VMH, Sargur and H.D.Kote govt hospital who were diagnosed for TB in past three months and those who will be diagnosed for the same in the next 6 months and gave consent for participating in the study were included as study subjects. Eligible cases were identified from the TB registers at H.D.Kote govt.Hospital (TU) and VMH (TU). A pretested structured questionnaire was used to collect the information. The study subjects were interviewed either by house visit or by doing the field visit to the place of work. Three follow up visits were made to each patient to check their adherence to treatment and outcomes. Data thus obtained was coded and entered into Microsoft excel and analyzed using SPSS version 22. Descriptive statistics, Chi square for qualitative discrete data with statistical significance level fixed at p=0.05 were used for analysis.

**RESULTS**

Jenukuruba community comprised of 68.7%. 78% of study subjects were in the age group of 16-30 years,

43.8% were illiterates, 75% were involved in unskilled occupation,46.9% belonged to socio economic class IV according to B.G .Prasad’s classification. History of smoking was present in 34.4% and alcohol was present in 43.8% of study subjects. Local migration for work (12.5%), Negligence and as well as the bad habits of the patient(12.5%) were the reasons non adherence during the second and third visit leading to defaulting of treatment. Association between illiteracy, alcohol use, alcohol frequency and non adherence to treatment were found to be statistically significant(p<0.05). 25% of the study subjects were defaulters by the end.

**Table 1: Socio Demographic Profile of Patients**

Sl. No.	Details		Number	Percentage
1.	Sex	Male	17	53.1
		Female	15	46.9
2.	Age	16-30Yrs	25	78.1
		31-60 Yrs	7	21.9
3.	Education	Illiterate	14	43.8
		Primary school	9	28.1
		Middle school	5	15.6
		Secondary	4	12.5
4.	Tribal Category	Jenu kuruba	22	68.8
		Kadu Kuruba	2	6.3
		Yerava	4	12.5
		Soliga	4	12.5
5.	Type of occupation	Unemployed	1	3.1
		Unskilled	24	75
		Semiskilled	1	3.1
		Skilled	6	18.8
6.	History of smoking	Present	11	34.4
		Absent	21	65.6
7.	History of Alcohol	Present	14	43.8
		Absent	18	56.2
8.	SES Status Socio-economic status	I- Upper class	0	0
		II-Upper middle	1	3.1
		III-Lower middle	5	15.6
		IV-Upper lower	15	46.9
		V-Lower	5	15.6
		Non- Respondents	6	18.8



Table 1 shows that most of the study population belonged to Jenukuruba community, comprised of 68.7% of the total study population. Most of the study subjects are in between the age group of 16 to 30 yrs, constituted 78% of the total study population. Majority of the study subjects were males who constituted 53% of the total study subjects. 43.8% were illiterates, 56.2% of the subjects were literate. Majority of the study subjects (75%) were involved in unskilled occupation while 18.8% were in skilled occupation. Majority of study subjects (46.90%) belonged to upper lower, lower middle (15.6%) and lower (15.6%) socio economical status according to modified B G Prasad socio economic scales. . History of smoking was present among 34.4% study subjects and history alcohol use was present in 43.8% of study subjects.

**Table 2: Factors influencing Adherence during second visit**

Sl. No.	Adherence	Factors	n (%)
1.	Yes	Wants to cure and live/ should not spread	16 (50)
		Wants to live healthy	5 (15.6)
		Told by hospital staff/ dots provider	4 (12.5)
		Fear of death	0
2.	No	Local migration for work	4 (12.4)
		Negligence/ Bad habits	3 (9.3)
		Side effects of drug	0 (0)

**Table 3: Factors influencing Adherence in third visit**

Sl. No	Adherence	Factors	n (%)
1.	Yes	Wants to cure and live/ should not spread	13 (40.6)
		Wants to live healthy	9 (28.1)
		Told by hospital staff/ dots provider	2( 6.3)
		Fear of death	0
2.	No	Local migration for work	4 (12.5)
		Negligence/ Bad habits	4 (12.5)
		Side effects of drug	00

Total 3 visits had been made by each patient during their full course of the DOTS treatment.

During the first visit the adherence was 100%. The commonest reason influencing adherence was the motivation from the hospital staff/ DOTS provider (68.8%).

During the second visit the commonest reason influencing adherence was the self motivation by the patient to cure the disease (50%). The commonest reason for non adherence was local migration for work (12.4%). [Table 2]

During the third visit the commonest reason influencing adherence was self motivation/ and should not spread to others (40.6%). Again the commonest reason for non adherence was local migration for work (12.4%) , Negligence as well as the bad habits of the patient (12.5%). [Table 3]

**Table 4: Factors determining Adherence to treatment in second visit**

Sl. No	Characteristics	Adherence		p-value
		Yes	No	
01.	<b>Tribals</b>			0.556
	Jenu Kuruba	16	6	
	Kadukuruba	2	0	
	Yarava	3	1	
	Soliga	4	7	
02.	<b>Age (Years)</b>			0.511
	16-30	19	6	
	31- 60	06	1	
03.	<b>Education</b>			0.108
	Illiterate	9	5	
	Literate	16	2	
04.	<b>Occupation</b>			0.294
	Service	1	0	
	Agriculture	1	0	
	Labourer	20	4	
	Un employed	3	3	
05.	<b>Distance to Health facility</b>			0.400
	0-10 Kms	18	6	
	11-20 Kms	7	1	
06.	<b>Smoking</b>			0.456
	Yes	8	3	
	No	17	4	

Table No. 4 Conted...

07.	<b>Alcohol</b>			0.050
	Yes	7	5	
	No	18	2	
08.	<b>Alcohol frequency</b>			0.086
	None	18	2	
	Daily	5	3	
	Alternative days	1	2	
	Weekly	1	0	

Table 4 shows that Jenu kurubas are in the majority in this study. 50% of the Jenu kurubas were successfully adhering to the DOTS treatment. Regarding non adherence to the treatment 18.7% of the Jenu kuruba were in the majority, which was not statistically significant. In the age group of 16 to 30 years majority of 59.3% of the patients were adhering to the treatment. 56.2% of the patients who were living within the 1 to 10 kms distance from the DOTS centre had successful adherence, which was not statistically significant. 56.2% of non smokers were successful to adherence of DOTS, which was statistically significant(p<0.05).

**Table 5: Factors determining Adherence to treatment in third visit**

Sl. No	Characteristics	Adherence		
		Yes	No	p-value
01.	<b>Tribals</b>			0.467
	Jenu Kuruba	15	7	
	Kadukuruba	2	0	
	Yarava	3	1	
	Soliga	4	0	

**Table 6: Final treatment outcome**

DOTS category	Outcome		Total n (%)
	Default n(%)	Cured/completed n(%)	
Category 1	6 (18.7)	21 (65.6)	27 (84.4)
Category 2	2 (6.2)	3 (9.5)	05 (15.6)
Total n (%)	8 (25)	24 (75)	32 (100)

Table 6 shows that out of 32 study participants 24 (75%) patients were cured because of their successful adherence and 8 (25%) patients were defaulters of the treatment.

**DISCUSSION**

- According to this study majority of study subjects were from the productive age group of 16 to 30 yrs.

Table No. 5 Conted...

02.	<b>Age (Years)</b>			0.423
	16-30	18	7	
	31-60	6	1	
03.	<b>Education</b>			0.050
	Illiterate	8	6	
	Literate	16	2	
04.	<b>Occupation</b>			0.409
	Service	1	0	
	Agriculture	1	0	
	Labourer	19	5	
	Un employed	3	3	
05.	<b>Distance to Health facility</b>			0.311
	0-10 Kmtrs	16	7	
	11-20 Kmtrs	8	1	
06.	<b>Smoking</b>			0.256
	Yes	17	4	
	No	7	4	
07.	<b>Alcohol</b>			0.031
	Yes	17	2	
	No	7	6	
08.	<b>Alcohol frequency</b>			0.006
	None	18	2	
	Daily	5	3	
	Alternative days	0	3	
	Weekly	1	0	

Table 5 shows that 50% of the literate patients were successful to adherence, whereas 18.7 illiterate patients were unsuccessful to the adherence of DOTS treatment, which was statistically significant. 6.2% of the alcoholic patients were not successful to adherence, which was statistically significant. Patients who consume alcohol daily or alternate days were unsuccessful to adherence of DOTS, which was statistically significant(p<0.05).

This will indirectly increase the financial burden on the families of the patients.

- In a study conducted by **Murry CJL et al<sup>4</sup>** observed that TB affects the most productive age groups. While morbidity and mortality in any age group has significant social and economic costs, death in

prime aged adults (economically productive age ) who are parent and bread earners in most societies have a particularly enormous burden.<sup>[4]</sup>

- Majority of the patients (93.8%) came in direct contact with TB patients before developing TB. It shows the lack of awareness regarding preventive measures by the patient as well as the people suffering from TB.
- In this study history of smoking was present among 34.4% study subjects. It shows that people who smoke have a greater risk of becoming infected with tuberculosis and of having that infection turn into active TB disease.
- Similarly **Jerard M et al**<sup>5</sup>, also found that tuberculosis was significantly associated with smoking.<sup>[5]</sup>
- In the present study the history of alcohol use was present in 43.8% of study subjects. It shows that the people who consume alcohol have a greater risk of becoming infected with tuberculosis and of having that infection turn into active TB disease. Similar observation was done in a study conducted by **Rajeshwari R et al**<sup>6</sup>, found that patient delay was greater if the patient was an alcoholic.<sup>[6]</sup>
- Adherence to the long course of TB treatment is a complex, dynamic phenomenon with a wide range of factors impacting on treatment-taking behavior. Patients' adherence to their medication regimens was influenced by the interaction of a number of these factors. The findings of this review could help inform the development of patient-centered interventions and of interventions to address structural barriers to treatment adherence.<sup>[10]</sup> Similarly in this study, three different visits made to patient to know the factors influencing the treatment adherence
- During the first visit the adherence was 100%. The commonest reason influencing adherence was (68.8%) the motivation from the hospital staff/ DOTS provider. During the second visit the commonest reason (50%) influencing adherence was self motivation by the patient to cure the disease. The commonest reason for losing adherence was the local migration for work(12.4%).
- **Nabil et al**<sup>7</sup> in their study, the observed that barriers to DOTS adherence stem from a multiple

dimensions of socio-cultural influences, leading to a clash between cultural and public systems as well as a gap between patient and provider's perspectives. During the third visit the commonest reason influencing adherence was the self motivation/ and should not spread to others. Again the commonest reason for non adherence was the local migration for work (12.4%) , Negligence as well as the bad habits of the patient (12.5%). Similarly in their study **Nabil et al**<sup>7</sup> stated that the main reason for not completing the treatment was the impression of being cured. Several studies have reported feeling cured as the main reason for defaulting. Local migration for work and bad habits are two important factors for non adherence to treatment.<sup>[7]</sup>

- Poor compliance with treatment was common among patients with poor knowledge, disruption of medication often occurred because patients failed to fully understand the necessity and importance of prolonged, uninterrupted treatment in this study<sup>[11]</sup>. A study in Egypt revealed that the significant risk factors for treatment failure were non-adherence to treatment, due to deficient health education and poor patient knowledge about the disease<sup>[08]</sup>. In a study by **Nabil Tachfouti, et al**<sup>7</sup> conducted on 'to study is the first to explore knowledge, attitude and treatment default in Fez region'.found that, Poor awareness especially regarding symptoms and treatment results and consequence were reported to have been associated with treatment non-completion, in accordance with other settings results.<sup>[9]</sup>

## CONCLUSIONS

25% of the study subjects were defaulter for the DOTS treatment at the end of the study. Local migration for work and negligence/bad habits were the strongest barriers for adherence to treatment. Introduction of a checklist including all socio demographic factors responsible for defaulting the treatment. Special attention to strengthen the network and linkages between the DOTS centres to mitigate the default to treatment due to migration for work. Creating awareness through specific, effective and innovative IEC and BCC campaigns in tribal areas.

**Conflict of Interest:** None declared

**Source of Funding:** No funding sources

**Ethical Approval:** Approval was obtained from the institutional ethics committee

**Limitations:** Study was conducted in tribal areas the results of which cannot be generalized.

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# Language Proficiency among Higher Secondary Students with Respect to Psychological Factors

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## ABSTRACT

Language differentiates the person from other living creature. Especially the English language universally connects the people with no bias. In this study language proficiency measured with reading and writing skills. The both skills are compliments each other. The psychological factor refers to the scores obtained by the eleventh standard students in the multidimensional personality inventory. Psychological factors affect the language skills of the person. The domains namely cognitive and affective influence the language skills of the learner. In this study the researcher used the English language proficiency test by K.S. Misra and Ruchi Dubey, for reading and writing skills. For assessing the psychological factors, Multi-dimensional personality inventory by Agarawal (1986) was used. The statistical calculation inferred that self- concept and temperamental traits of psychological factors show difference in reading and writing skills, while other psychological factors namely: social participation, dependency, adjustment doesn't influence the reading and writing skills of the students.

**Keywords:** language proficiency, writing skill, reading skill, psychological factors

## INTRODUCTION

Language according to Cambridge dictionary is “a system of communication consisting of sounds, words, and grammar, or the system of communication used by people in a particular country or type of work”.<sup>1</sup> Languages differentiates the person from other living creature. Especially the English language universally connects the people with no bias. In this study language proficiency measured with reading and writing skills. The both skills are compliments each other.

Language acquisition is a process wherein an individual acquires the basic elements of language: the semantics, alphabets, sentence construction, manner of articulation, grammatical structure. It is multi staged process where the individual develops vocabulary initially followed by sentence formation and finally developing language competency.<sup>2</sup>

**Reading skills:** Reading is one of the language skills and one of the gateways of getting worldly knowledge. Traditionally, reading was considered as a passive skill, but it is today considered as an active one, and one's reading ability decides his academic success. Reading

is the best source of input of our human brain. The vast reading enhance the good output of writing skill

Reading is a complex and conscious activity using the written symbols meaning and ideas are obtained. However, the readers' background knowledge is necessary for complete understanding of a text.

The important components of the reading skills are<sup>3</sup>:

- Recognition of the graphemes.
- Recognition of the correlation of graphemes within words.
- Recognizing word boundaries and sentence boundary.
- Recognizing the meaning of words and its relationship in sentence.
- Recognizing relationship between and among sentences in a discourse.
- Deducing meaning of unfamiliar words
- Inferring implicit and explicit information and ideas of text, etc.

**Writing skills:** Writing is a planned activity done consciously. A mono literate is a person who can read and write in a language and a biliterate or multi literate can read and write in more than one language. A literate person in a language can convey his inner speech through written mode. That is to say that one may be literate in one language and illiterate in another language. Writing is the best form of communication that occurs in the world. The ideas, concepts of a person are apparently conveyed through writing skills.

The writing skill includes a number of sub skills given by (Sobana, 2003:26)<sup>3</sup>:

- Mechanics-handwriting, spelling, punctuation
- Word selection-vocabulary, idioms, tone.
- Organization-paragraphs, topic and support, cohesion and unit
- Syntax-sentence structure, sentence boundaries, stylistics, etc..
- Grammar-rules of verbs, agreement, articles, pronouns, etc.
- Content-relevance, clarity, originality, logic, etc.
- The writing process-getting ideas, getting started, writing drafts, revising etc.
- Purpose-the reason for writing, justification

**Psychological factors:** The psychological factor refers to the scores obtained by the eleventh standard students in the multidimensional personality inventory. Psychological factors affect the language skills of the person. The domains namely cognitive and affective influence the language skills of the learner<sup>5</sup>.

**OBJECTIVES OF THE STUDY**

1. To study the reading skills among higher secondary standard students.
2. To study the relationship between reading and writing skills and Psychological factors.

**Hypothesis of the Study**

1. There is no relationship among language skills and psychological factors among students.

**Sample of the Study:** The sample consists of 11<sup>th</sup> standard students studying in different types of

management schools n and around kanchipuram district in Tamil Nadu state. A total of 477 11<sup>th</sup> standard students constitute the sample of the present study.

**Tools Used in the Study:** The following tools are used in this present investigation:

**Assessment of Reading and writing skills**

**English language proficiency test by K. S. Misra and Ruchi Dubey** <sup>6</sup>.

This test was used to find out the reading and writing skills. This test consists of 56 questions in 14 areas of English language. The English language proficiency test is based on the course based on U.P board for class X. On the basis of Hubley’s (2003) definition. Proficiency in English may be defined as the knowledge related to English language that individual acquires through a formal educational experience. Proficiency in English encompasses student’s terminal performance in English Language<sup>7</sup>.

**Table 1: Showing content areas and weightage given to ELP test**

S. No.	Areas/Content	Weightage (%)
1.	Noun	7
2.	Pronoun	7
3.	Adjective	7
4.	Verb	7
5.	Adverb	7
6.	Preposition	7
7.	Spelling	7
8.	Tenses	7
9.	Sentence	7
10.	Article	7
11.	Translation	7
12.	Word-formation	7
13.	Active-Passive	7
14.	Direct-indirect	7

**Assessment of Psychological factors**

**Multidimensional Personality Inventory:** For assessing the psychological factors, Multi-dimensional personality inventory by Agarawal (1986) was used. This tool contains 120 items with 6 dimensions namely<sup>8</sup>:

- 1. Extraversion-introversion:** This variable identifies whether a person's orientation is based on objective condition or facts (Extrovert) or on one self (introvert). Extroverted behaviour is primarily directed by external environment, objectives or facts, whereas introverted behaviour is directed by him.
- 2. Self-concept:** The self-concept has been considered central construct of the personality. It is the organized conceptual relationship of the 'I' and 'me' to others and to various aspects of life together value attached to this in terms of self-personification, self-esteem, self-image and self-sentiment.
- 3. Independence-dependence:** It is associated with the personality which has close relationship to intelligence and its influences.
- 4. Temperament:** This refers to the reactions of the person towards emotional situations. It is related to the consistency or mental imbalance and is considered as one of the important factors of personality
- 5. Adjustment:** It is an index of integration between needs and stress which has close relation to personality. By the process of adjustment an individual experiences several facts and events by which he tries to reshape his personality.
- 6. Anxiety:** Concept of anxiety occupies a very important place in the study of human personality

and multitude activities of the mind. Anxiety is something felt unpleasant effect of state or condition. This state was characterized by all that is converted by the word 'nervousness' apprehension or anxious expectations and different discharge phenomena<sup>9</sup>.

The inventory has 120 items and each 20 items are related to the above mentioned dimensions of personality. Each item has three alternatives answers 'yes', 'sometimes' and 'no'. The score is given in the following manner. 3 for yes, 2 for sometimes and 1 for no.

**Reliability and validity:** Cronbach Alpha reliability and validity values are found to be 0.86 and 0.92 respectively for teacher samples and .83 and .91 respectively for student samples. The reported reliability value for the inventory is .74.

## ANALYSIS AND INTERPRETATION

**Table 2: showing Mean and Standard deviation of language skills<sup>10</sup>**

Variables	N	Max. Scores	Whole sample	
			Mean	S.D
Reading and writing skills	477	100	28.69	12.06

From the table 2 is found that the mean value of reading skills is 28.69 and hence the selected samples of higher secondary school students have average level of reading skills.

**Table 3: Showing the mean and Standard Deviation of reading and writing skills with respect to different Psychological factor groups**

Variable	Groups	N	Mean	S.D	t- value	df	Level of significance at .01 level
Reading and writing skills	Introvert students	101	30.15	9.58	1.373	475	Not significant
	Ambivert students	376	28.30	12.63			
	Low self- concept	365	27.18	12.04	5.068	475	Significant
	High self- concept	112	33.62	10.79			
	Independent students	130	29.90	11.69	1.343	475	Not significant
	Dependent students	347	28.24	12.19			
	Good temperament	432	28.06	12.08	3.583	475	Significant
	Poor Temperament	45	34.75	10.21			
	Good Adjustment	290	28.05	12.10	1.454	475	Not significant
	Poor Adjustment	187	29.69	11.96			

From table 3, it is inferred that self- concept and temperamental traits of psychological factors show difference in reading and writing skills, while other psychological factors namely: social participation, dependency, adjustment doesn't influence the reading and writing skills of the students.

### FINDINGS OF THE STUDY

1. Students have average level of reading and writing skills.
2. The psychological factor: social participation doesn't influence reading and writing skills.
3. The psychological factor: dependence doesn't influence reading and writing skills.
4. The psychological factor: temperament influence reading and writing skills.
5. The psychological factor: Adjustment doesn't influence reading and writing skills.
6. The psychological factor: Self-concept influence reading and writing skills.

### RECOMMENDATIONS

1. As the reading and writing skills is average measures has to be taken to improve the reading and writing skills among higher secondary school students.
2. The self-concept and temperamental traits influences the reading and writing skills of the students and hence it has to be taken into to account while enhancing the reading and writing skills.
3. For enhancing the language proficiency the students have to think and analyze the content in the English language itself. The teachers provide the platform for them showcase their talents.

**Ethical Clearance:** Not Required

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Profile of Patients Who Underwent Abortion in Tertiary Medical College in Trichy: A Descriptive Study

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## ABSTRACT

**Introduction:** The Medical Termination of Pregnancy (MTP) was legalized in India by an Act in 1971.

**Method:** This study is a retrospective data based study of two years. The objective of the study was to study the profile of patients who underwent abortion in a medical college hospital in Trichy.

**Results:** Prevalence of abortion were more common between the age of 21 and 30 years of which spontaneous abortion was more common. In our study abortions were almost equal in first and second trimester. Various other parameters like educational status in which abortions were common were also studied.

**Conclusion:** Poor utilization of abortion services as reflected in the present study calls for creation of awareness among women regarding availability of safe abortion services.

**Keywords:** Abortion, tertiary care, Profile, Retrospective study, Tamil nadu.

## INTRODUCTION

Abortion is the termination of pregnancy before its full term. Spontaneous abortion is pregnancy resulting in miscarriages without the application of any deliberate methods to terminate it during the early weeks after conception. Risk factors for abortion include old age, previous miscarriage, tobacco use, obesity, diabetes, thyroid problems, drugs and alcoholism. Common causes of spontaneous abortion include hormonal factors, chromosomal factors, uterine abnormalities, autoimmune disorder. Induced abortion on the other hand is often done using several dangerous procedures under substandard clinical and unsanitary conditions. Women access to safe abortion services is essential to safeguard their health and is one of the important components of Reproductive and Child Health Programme.

Abortion was liberalized in India after the 1971 Medical Termination of Pregnancy (MTP) Act came into

effect on 1 April 1972, according to which a pregnancy may be terminated within 20 weeks of gestation. Before 1972, abortion was permitted only if it was necessary to save the life of the woman. Now it is also allowed on the grounds of preserving her mental or physical health, as well as in case of pregnancy due to rape, incest or contraceptive failure. In India, where abortion has been legalized for over twenty-five years, various surveys suggest that abortions are responsible for 10-20 per cent of all maternal deaths.<sup>1</sup> Very few studies have tried to present some kind of valid estimates about the incidence of abortion both at the national and global level.<sup>2</sup> This huge data gap in the area of abortion is to some extent due to the fact that safe and legal abortion services are far and few between with the result that a large number of women receive abortion services from illegal sources and these are never reported<sup>3</sup>. Hence the study was conducted to ascertain prevalence and various factors affecting Abortion.

## METHODOLGY

This retrospective record based study was carried out in a tertiary care hospital in Trichy, Tamilnadu for a period of two months. Data was collected from medical record department for a period of 2 years (2016-2017). Of the total sample size 142, 100 fitted in the inclusion criteria. Patients of medical abortion lost to follow up, Patients

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undergone MTP at other center and then referred, Vesicular mole and septic abortion were excluded from the study. Data was entered and analyzed using SPSS v.15.0

## RESULTS

**Table 1: Abortions In Different Age Categories**

Age	Spontaneous	Induced	Total
<20	7 (70%)	(30%)	10
21-25	35(89.7%)	4(10.3%)	39
26-30	32(97%)	1(3%)	33
31-35	11(84.6%)	2(15.4%)	13
>36	5(100%)	0	5
Total	90	10	100

Abortions are more common among 21- 30 age group. 67% of abortions were spontaneous abortions 13.3% of abortions were induced abortions. abortion is least common among the age group >36 years in which spontaneous abortion forms 100% and induced abortion 0%

**Table 2: Abortions in relation to educational status (n = 100)**

Education	Type of Abortion		Total	Percentage
	Spontaneous	Induced		
Illiterate	3(100%)	0	3	3%
Upto Middle School	28(95.2%)	1(4.2%)	29	29%
High School & Higher Secondary	48(88.6%)	7(11.4%)	55	55%
Graduates	11(85%)	2(15%)	13	13%
Total	90	10	100	100%

Abortion Is More Common(55%)In The High School And The Higher Secondary School Category in which spontaneous abortion forms 88.6% and induced abortion 11.4% and least common(3%) in illiterate category. However spontaneous abortion is common(100%) in illiterate category than induced abortion(0)

**Table 3: Abortions in different religions (N = 100)**

Religion	Types of Abortion		Total	Percentage
	Spontaneous	Induced Abortion		
Hindu	62(89.9%)	7(10.1%)	69	69%
Muslims	11(84.6%)	2(15.4%)	13	13%
Christians	17(94.4%)	1(5.6%)	18	18%
Total	90	10	100	100%

In our study abortions are more common in hindu category(69%),of which 89.9% was spontaneous abortions and 10.1% was induced abortion

**Table 4: Abortions in relation to trimesters (N = 100)**

Trimester	Type Of Abortion		Total	Percentage
	Spontaneous	MTP		
First Trimester	43(86%)	7(14%)	50	50%
Second Trimester	47(94%)	3(6%)	50	50%
Total	90	10	100	100%

In our study abortions are almost equal in first and second trimesters(50%) however spontaneous abortion is common In second trimester and MTP is common in second trimester.

## DISCUSSION

The prevalence of abortion in different age group, trimesters, education status in the present study is similar to study conducted by Biswas DK et.al<sup>4</sup>who found nearly 61.2% of their abortion cases were between the age of 20 to 29 years followed by 12-19 years of 31.5%. In our study 72% of abortion cases were between the age of 20 and 29.

In the present study 48% of abortions were occurred at primi gravida, whereas multigravida comprised of 52%which is similar to study conducted by Biswas DK et.al in which 51.3% abortions resulted in primi and 48.7% in multigravida.Whereas in a study conducted by Ameet Patki et al.<sup>5</sup> 68% abortions resulted in primi gravida and 32% in multigravida<sup>4</sup>

With regards to educational status 35% belonged to high school followed by illiterates and primary school, which is similar to study conducted by Biswas DK 55% abortions occurred in grade 6<sup>th</sup> to 10<sup>th</sup> .

In the present study nearly 70% underwent MTP during first trimester, 30% were among second trimester which is similar to study conducted by Veena L.<sup>6</sup>

## CONCLUSION

Poor utilization of abortion services as reflected in the present study calls for creation of awareness among women regarding availability of safe abortion services.

**Source of Funding:** Self

**Conflict of Interest:** None declared

**Ethical Clearance:** Obtained from institutional ethical committee of CMCHRC, Trichy

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# Role of MDCT in Evaluation of Acute Abdomen

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## ABSTRACT

**Background:** Acute abdomen is defined as a clinical syndrome characterized by sudden onset of pain in the abdomen. Multi detector CT plays an important role in the diagnosis of the cause of acute abdominal pain and thereby initiating proper treatment.

**Aims and Objectives:** The primary objective of this study was to find the efficacy of multi detector computed tomography in detecting and characterizing the findings of acute abdomen and further planning of treatment.

**Materials and Method:** A total of 160 patients were included in this study who were referred with symptoms of acute abdominal pain and patients with blunt trauma. MDCT examination was conducted and results are confirmed with gold standard investigations.

**Results and Conclusion:** The sensitivity and specificity of MDCT in detecting the cause of acute abdomen is very high. MDCT should be the first line of investigation for most of the acute abdominal conditions.

**Keywords:** Acute abdomen, Multi Detector CT, Acute appendicitis, Acute cholecystitis, Bowel obstruction.

## INTRODUCTION

Acute abdomen is defined as a clinical syndrome characterized by sudden onset of pain in the abdomen.<sup>1</sup> Acute abdomen could be a term often used to describe the acute abdominal pain in a subgroup of patients who are seriously sick and have abdominal tenderness and rigidity that develops over a period of hours. Acute abdomen includes the diseases which can involve the gastro intestinal system, hepato-biliary system, solid viscera or genitourinary system etc.

Before the widespread use of imaging, these people were the candidates for surgery. However, with the role of imaging, some patients with acute abdomen need not undergo surgical intervention.

Conventional radiography is usually the initial imaging examination performed. Patients suspected to have intestinal obstruction, hollow viscous perforation, urinary tract calculi, or foreign bodies<sup>2</sup> the accuracy of diagnosing is good using conventional radiographs.

Ultrasonography (US) is one of the most common type of imaging modality used in diagnosing the cause of acute abdominal pain.<sup>3</sup> Easy availability, lower prices, and lack of radiation exposure are the benefits of this modality. The main advantage of this method is that it is a real time technique and the radiologist can look for the peristalsis and using doppler, the blood flow can be depicted.

Computed tomography has gained widespread acceptance as an accurate modality to diagnose the cause of acute abdominal pain.<sup>4</sup> The introduction of multidetector CT scan (MDCT) technology has created an additional benefit in diagnosing the patient with acute abdominal pain. There are many advances in MDCT scanner like 3D reconstruction, contrast dynamics, and high-resolution volumetric information acquisition. MDCT is a fast and cost-efficient method. Conventional CT studies in acute abdomen have demonstrated almost 95% accuracy.<sup>5</sup> Along with the diagnosis of primary abnormality, MDCT can additionally help in detection and characterizing the

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total extent of the disease. Hollow viscera, solid organs, peritoneum, lymph nodes, retroperitoneum etc., are easily viewed with MDCT. Information can be acquired in different phases making MDCT an ideal modality for evaluation of mesenteric ischemia or vascular disorder like abdominal aortic aneurysms.

Magnetic resonance (MR) imaging is not so widely used in the diagnostic work-up of patients who present with acute abdominal pain. Lack of ionizing radiation is the major advantage of this examination. The intrinsic contrast resolution with MR imaging is another advantage. The use of MR imaging at this point is limited to selective patients like pregnant women where US demonstrating nonspecific diagnosis.

In our study, the primary objective is to find the accuracy of MDCT in detection of cause of acute abdominal pain and in characterizing the imaging findings to diagnose the disease which further helps in planning the treatment.

### AIMS AND OBJECTIVES

1. To evaluate the accuracy of multi detector computed tomography in detection and differential diagnosis of acute abdominal pain
2. To evaluate the efficacy of multi detector computed tomography in characterization of the spectrum of imaging findings which helps in the diagnosis.
3. To evaluate the role in assessment and further planning of treatment.

### MATERIALS AND METHOD

In this prospective study, 160 patients referred from various departments to Department of Radio diagnosis and Imaging at Sri Lakshmi Narayana Institute of Medical Sciences with symptoms of acute abdominal pain and blunt trauma abdomen were included. Patients with penetrating abdominal injuries and obstetric emergencies are excluded from study.

32 slice Siemens Somatom Scope MDCT system with advanced workstation was used to scan the patients.

### STATISTICAL ANALYSIS

Data was collected and statistically analyzed. Data was analyzed using SPSS software and data was used in

categorical variable Chi Square/ Fischer Exact Test. The level for statistical significance was taken as  $p \leq 0.05$ .

### FINDINGS AND RESULTS

The findings at multi-detector CT abdomen were diverse and were divided into following groups:

1. Inflammatory Conditions
  - (a) Acute urinary colic
  - (b) Acute pancreatitis
  - (c) Acute appendicitis
  - (d) Acute pyelonephritis
  - (e) Acute cholecystitis
  - (f) Intra-abdominal abscess
  - (g) Acute diverticulitis
2. Mechanical Causes
  - (a) Bowel obstruction
  - (b) Perforation of hollow viscus
3. Bowel ischemia or vascular causes
4. Traumatic causes
5. Miscellaneous

**Table 1: Case Distribution of the Study Population**

Cases	Total Number of Each Case Type N = 160	Percentage (%)
Acute urinary colic	36	22.5
Acute pancreatitis	30	18.75
Acute appendicitis	22	13.75
Acute pyelonephritis	14	8.75
Miscellaneous (epiploic appendagitis, acute mesenteric adenitis, acute colitis, peritonitis, etc.)	11	6.875
Acute cholecystitis	11	6.875
Bowel obstruction	9	5.625
Intra-abdominal abscess	7	4.375
Perforation of hollow viscus	6	3.75
Traumatic causes	6	3.75
Bowel ischemia or vascular causes	5	3.125
Acute diverticulitis	3	1.875

**1a. Acute Urinary Colic:** MDCT diagnosis of acute urinary colic was made in 36 cases, out of which 12 cases were of renal calculi, 22 cases of ureteric calculi and 2 cases of urinary bladder calculus (Fig 1).

CT scan showed peri renal/ peri ureteric stranding in 26 patients and hydro uretero nephrosis in 28 patients. Out of 26 patients with HUN, 8 patients were having Grade 1 HUN, 9 patients were having Grade 2 HUN, 7 patients were having Grade 3 HUN and 4 patients were having Grade 4 HUN.

All cases diagnosed on CT were confirmed on surgery or responded to conservative management.

Denis Tack et al in a study of 106 patients with acute renal colic demonstrated sensitivity of 94.7 and specificity of 100% in the year 2003.

Present study demonstrates 100% sensitivity and specificity.



**Fig 1(a, b)- Coronal and Sagittal CT KUB images showing hydronephrosis (white arrow) in right kidney due to right proximal ureteric calculus (yellow arrow). Coronal images of CT abdomen(1c) demonstrating a large bladder calculus (yellow arrow) causing bilateral hydro ureteronephrosis (white arrow).**

**1b. Acute Pancreatitis:** MDCT diagnosis of acute pancreatitis was made in 29 patients and out of which 13 patients had acute mild pancreatitis CTSI-(1-3), 12 patients had acute moderate pancreatitis CTSI-(4-6), and 4 patients had acute severe pancreatitis CTSI-(6-10).

CT scan of abdomen revealed focal/diffuse enlargement of pancreas in 29 patients, peri pancreatic fat stranding in 26 patients, peri pancreatic fluid collection in 15 patients and lack of parenchymal enhancement in 12 patients.

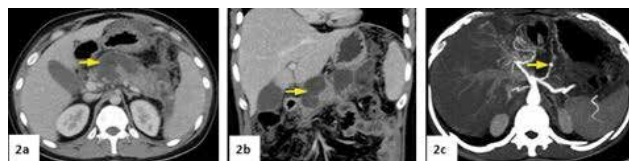
3 patients were associated with gall bladder calculus/calculi. 2 patients had pseudocyst of pancreas. 1 patient had pseudoaneurysm (Fig 2c).

1 case was false negative by CT scan, which was confirmed by clinical and laboratory parameters like amylase & lipase levels.

Rest of all the patients were diagnosed by CT and subsequently responded to treatment of acute pancreatitis or confirmed by laboratory parameters and/or on surgery (Fig 2a, 2b).

Dario Casas et al<sup>6</sup> in a study conducted in the year 2004 with a study population of 148 demonstrated a sensitivity of 100% and Specificity of 61.6% for predicting morbidity

Present study demonstrates 96.6% sensitivity and 100% specificity.



**Fig (2a, b)- Axial and Coronal CT images of abdomen demonstrating bulky pancreas with heterogeneous enhancement (yellow arrow) with non-enhancing necrotic collection (>30%) involving the entire length of pancreas extending into peripancreatic region with surrounding fat stranding. Fig (2c)- Axial CECT image showing a small pseudoaneurysm (yellow arrow) in a case of acute pancreatitis.**

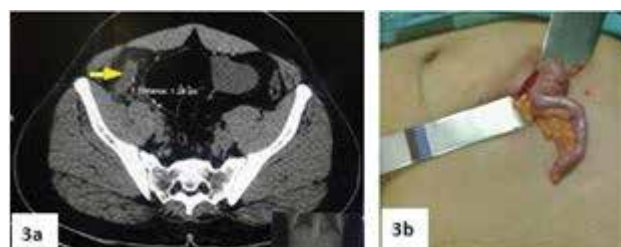
**1c. Acute Appendicitis:** MDCT diagnosis of acute appendicitis was made in 22 patients.

CT scan revealed distended lumen (>6mm diameter) in 22 patients, peri-appendiceal inflammation in 22 patients, adenopathy in 17 patients, extraluminal fluid in 13 patients, appendicolith in 6 patients and abscess in 3 patients.

The intra-operative findings were consistent with the CT findings in all the patients (Fig 3a, 3b).

Ujiki, Michael B. et al in a study conducted in the year 2002 with a study population of 125 patients demonstrated a sensitivity of 90% and Specificity of 89%.

Present study demonstrates 100% sensitivity and specificity.



**Fig 3a- Axial CT image of abdomen showing distended lumen of appendix (yellow arrow) with peri-appendiceal fat stranding suggestive of acute appendicitis. Fig 3b- Intra operative image of acute appendicitis.**

**1d: Acute Pyelonephritis:** MDCT diagnosis of acute pyelonephritis was made in 13 patients.

CT scan revealed edematous part of the kidney in 13 patients, perinephric fat stranding in 13 patients, non enhancing areas in 13 patients, debris in collecting system/ collecting system wall thickening in 9 patients and gas within the collecting system in 3 patients (emphysematous pyelonephritis).

One case was false negative on CT and was confirmed to have acute pyelonephritis clinically and with laboratory parameters like urine routine and microscopic examination. Rest all cases responded to conservative treatment or confirmed on surgery (Fig 4a).

Mitterberger et al in a study conducted in the year 2002 with a study population of 100 patients demonstrated 98% sensitivity and 100% specificity.

Present study demonstrates 92.8% sensitivity and 100% specificity.

**1e: Acute Cholecystitis:** MDCT diagnosis of acute cholecystitis was made in 9 patients (Fig 4b).

CT scan revealed gallbladder wall edema in 9 patients, gall bladder distension in 6 patients, pericholecystic fluid collection in 7 patients.

2 suspected cases which showed negative findings on CT and needed ultrasound correlation, from which 1 case was confirmed as calculus cholecystitis and 1 case was acute acalculus cholecystitis.

The usefulness of ultrasound scanning is high compared to CT in diagnosing the cause of acute cholecystitis whether calculi were present or absent. USG can detect pericholecystic fluid and soft calculus more accurately than CT, suggesting it is the modality of choice for acute cholecystitis.

Bennett GL et al<sup>7</sup> et al in a study conducted in the year 2002 demonstrated a 92% of sensitivity and 99% specificity.

Present study demonstrates 81.8% sensitivity and 100% specificity.

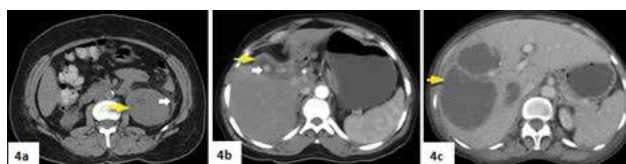
**1f: Intra Abdominal Abscess:** There were 7 cases of intra-abdominal abscess out of which 1 case was liver abscess (Fig 4c), 1 case was renal

abscess, 1 case was peritoneal abscess, 1 case was appendicular abscess, 1 case was iliopsoas abscess and 1 case was ruptured diverticula with abscess.

1 case was false negative, in which the CT diagnosis was not liver abscess and which was later confirmed as liver abscess based on clinical and lab parameters. Rest of all the cases diagnosed on CT, were confirmed on surgery or responded to conservative treatment.

Go HI et al<sup>8</sup> in a study conducted in 2005 demonstrated 95% sensitivity and specificity.

Present study demonstrates 85.7% sensitivity and 100% specificity.



**Fig. 4a:** Axial CT abdomen at the level of kidneys showing edematous left kidney (yellow arrow) and perinephric fat stranding (white arrow) suggestive of acute pyelonephritis. **Fig 4b-** Axial CT showing edematous GB (yellow arrow), few intraluminal calculi (white arrow) and pericholecystic fluid suggesting acute cholecystitis. **Fig 4c-** Axial CT abdomen shows hepatomegaly with multiple well-defined rim enhancing hypodense lesions (yellow arrow) in right lobe of liver suggestive of liver abscess.

**1g: Acute Diverticulitis:** CT findings of wall thickening and surrounding fat stranding was demonstrated in all 3 patients.

3 cases were confirmed on surgery (Fig 5a).

Kircher MF<sup>9</sup> in a study conducted in 2002 demonstrated 99% sensitivity and Specificity.

Present study demonstrates 100% sensitivity and specificity.

**2a: Bowel obstruction:** This group revealed 9 total number of cases, out of which 1 case was mid gut volvulus and 3 cases were sigmoid volvulus (Fig 6a, b), confirmed on surgery and colonoscopy followed by surgery respectively. 5 cases were of SBO (Fig 5b), of which 1 case was gall stone ileus, 2 cases were intussusception (Fig 5c) and 2 were jejunal closed loop obstruction. Among these cases of bowel obstruction, strictures & adhesions were the common causes.



Beall et al<sup>10</sup> in a study conducted in 2002 for SBO demonstrated 95% sensitivity of 95%, and 100% specificity.

Frager et al<sup>11</sup> in a study conducted in 1998 for LBO demonstrated 96% sensitivity and 93% specificity.

Present study demonstrates 100% sensitivity and specificity.

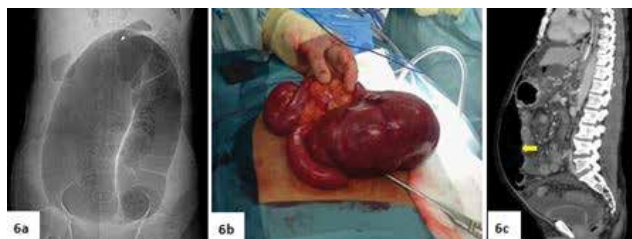


**Fig 5a- Coronal CT abdomen showing multiple diverticulae (white arrows) in the ascending colon of which one diverticula (yellow arrow) in right hypochondrium showing peri-diverticular fat stranding suggesting acute diverticulitis. Fig 5b- Axial CT abdomen demonstrating dilated small bowel loops (yellow arrow) due to a short segment stricture (white arrow) with enhancing wall and adjacent fat stranding suggestive of small bowel obstruction. Fig 5c- Axial CT abdomen showing herniation of distal jejunal loops with its mesenteric fat and vessels into proximal jejunal loops suggesting of jejunojejunal intussusception (yellow arrow).**

**2b: Perforation of Hollow Viscus:** This group showed 6 cases out of which 1 case was gastric perforation, 2 cases were perforation of 2<sup>nd</sup> part of duodenum, 1 case was jejunal perforation and 1 cases were gall bladder perforation and 1 diverticular perforation. All cases were confirmed on surgery (Fig 6c).

Hainaux et al<sup>12</sup> in a study conducted in the year 2006 with a study population of 85 demonstrated a Sensitivity of 89%, Specificity of 100%.

Present study demonstrates 100% sensitivity and specificity.



**Fig 6a- CT scanogram showing ahastral dilated loop of large bowel with an inverted U-shaped configuration (coffee bean) arising from pelvis**

**and its apex pointing towards left upper quadrant suggestive of sigmoid volvulus. Fig 6b- Intra operative image of sigmoid volvulus. Fig 6c- Sagittal CT image showing intra-abdominal free air (white arrow) suggestive of hollow viscus perforation.**

**3: Bowel Ischemia Or Vascular Causes:** 5 cases of bowel ischemia or vascular causes were found, out of which 2 cases were diagnosed as omental infarcts, 1 case was descending aortic aneurysm, 1 case was diagnosed as ischemic colitis while 1 case was diagnosed as dissecting aortic aneurysm. Cases of bowel ischemia was confirmed on triple phase CT, while abdominal aortic aneurysm was confirmed on surgery and omental infarction responded to conservative management.

Hassan et al in a study conducted in 2003 demonstrated a Sensitivity of 86.7% and Specificity of 100%

Present study demonstrates 100% sensitivity and specificity.

**4: Traumatic Causes:** 6 cases were diagnosed, all the cases had hemoperitoneum in common, & all 6 cases were confirmed on laparotomy. In 6 cases, 2 were AAST GRADE II liver injury, 1 was GRADE IV splenic injury, 1 was GRADE V kidney injury, 1 was GRADE II splenic injury and 1 was AAST GRADE I splenic injury.

Joshua et al<sup>13</sup> in a study conducted in 2004 in 1082 patients demonstrated a Sensitivity of 82% and Specificity of 99%.

Present study demonstrates 100% sensitivity and specificity.

**4: Miscellaneous:** There were 11 cases out of which 4 cases of Acute Colitis, 3 cases were of Acute Mesenteric adenitis, 2 cases were Acute Epiploic Appendagitis and 2 cases were Acute Peritonitis. All the cases were responded to conservative therapy or confirmed on surgery.

Ruedi F. Thoeni et al<sup>14</sup> in a study conducted in 2006 demonstrated a Sensitivity of 100% and Specificity of 80% for colitis.

Richard M. Gore et al<sup>15</sup> in a study conducted in 2000 demonstrated a Sensitivity of 88% and Specificity of 97% for colitis for acute mesenteric adenitis and choledocholithiasis.



Present study demonstrates 100% sensitivity and specificity.

### CONCLUSION

MDCT is playing a great role in the detection and characterization of acute abdominal pathology. The sensitivity and specificity of CT in determining the presence of acute abdominal pathology is very high and it is very accurate in finding the cause leading to acute abdomen. Multidetector CT has allowed the radiologist to display a finding in any desired plane as it has transformed an axial imaging modality into a volumetric one.

The diagnosis based on clinical findings is not accurate most of the times. The fact that a common symptom can arise from a broad spectrum of diseases combine to make acute abdomen difficult to diagnose. Therefore, MDCT helped to pick up correct diagnosis and its treatment in patients with acute abdominal pain. MDCT is the most important non-invasive, rapid and painless imaging tool to diagnose acute abdomen and it gives detail information about status of the disease and helps in intervention.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Obtained

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# Patterns and Distribution of Dental Caries and Dental Fluorosis in School Children of Sivakasi

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## ABSTRACT

**Aim and Objective:** To assess the prevalence of dental caries and dental fluorosis in school children living in sivakasi.

**Background:** Dental fluorosis is a developmental disturbance of dental enamel caused due to excessive ingestion of fluoride during enamel formation. The main cause is the water containing excess fluoride content especially ground water of particular community.it has become a major public health problem in india.This study is done to measure the prevalence of dental caries and dental fluorosis in school children residing in sivakasi.

**Materials and Method:** This study was done in school children of low socio-economic status between the age group of 6-10. 90 students from a school was selected.A proper dental examination was carried out after obtaining informed consent. Dean's fluorosis index (DFI) and DMFT was calculated. Severity and prevalence of dental fluorosis were assessed with DFI and Community Fluorosis Index (CFI) and was used to measure the burden of dental fluorosis in the study area.

**Conclusion:** The study concluded that 19% of children are affected by dental fluorosis and 55.5% of children affected by dental caries. Dental caries still remains as a major oral health issue among children.

**Keywords:** *fluorosis, caries, prevalence, children, dental*

## INTRODUCTION

Dental Caries is the most prevalent and chronic oral disease of human beings<sup>(1)</sup>. As dental caries prevalence is more both in children and adults ,it has been considered as most significant global oral health burden<sup>(2)</sup>. In developing countries, nutritional transition with easy access to refined carbohydrates, low use of fluorinated toothpaste and irregular tooth brushing habits lead to increased prevalence of dental caries<sup>(3)</sup>. The International Caries Detection and Assessment

System(ICDAS) developed caries detection based on visual inspection. This system is used for clinical research and epidemiological surveys for detecting cavitated and non-cavitated lesions with acceptable reliability<sup>(4)</sup>.

Fluorine is one of the essential microelement for proper growth and function of human body .It's complex form is fluoride which exists in groundwater <sup>(5)</sup> . In dentistry, deficiency of this fluoride is associated with defective enamel formation and excess of fluoride leads to dental and skeletal fluorosis<sup>(6)</sup> .Dental fluorosis appears as opaque white spots or lines and in some severe cases, there is presence of discolored and brittle enamel which leads to chipping<sup>(7)</sup> .Dental fluorosis is more prevalent in people consuming groundwater due to high level of fluoride in it<sup>(6)</sup> .Fluoride can also be present in foods like salt water fish,sorghum,finger millets. Thus consuming these food in excess can even lead to dental fluorosis<sup>(8)</sup>.

Therefore, a school based cross sectional study was done to quantify the prevalence of dental caries and dental fluorosis among school children in Sivakasi

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## MATERIALS AND METHOD

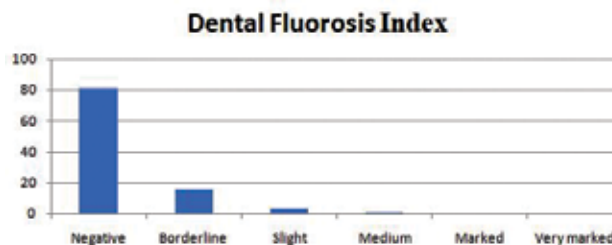
The present study was carried out in Sivakasi, a town located in the south side of Virudhunagar District, Tamilnadu. The topography is almost plain, with no major geological formation. There are no notable mineral resources available in and around the town. The ground water was free from colour, odour, and taste. This study was done in school children of low socio-economic status between the age group of 6-10.90 students from a school was selected. The dental examination was done by a single qualified dental professional using a probe and mouth mirror in bright daylight along with artificial light source with subject seated on an ordinary chair. Instruments were disinfected with an antiseptic solution after every use. Dean’s fluorosis index (DFI) and DMFT was calculated. Severity and prevalence of dental fluorosis were assessed with DFI and Community Fluorosis Index (CFI) and was used to measure the burden of dental fluorosis in the study area. Prior to the examination, study design was explained to the qualifying participant’s parents and informed consent was obtained from the parents.

## RESULTS

According to the study done in primary school, the Community Dental Fluorosis was found to be 0.2 which falls under negative. 81% of the children fall under negative, 15% of the children are in borderline, 3% of the children have very mild fluorosis and 1% have mild fluorosis. Among 81% of the children falling under negative in fluorosis index, seventeen are 6 year old children, nine are 7 year old children, seventeen are 8 year old children, fifteen are 9 year old children and fourteen are 10 year old children. 8 year old children are comparatively more prone to fluorosis followed by 9 year, 10 year, 6 year, 7 year old children respectively. The study has shown that males are more prevalent to fluorosis than females. 54.5% of males are affected and 45.4% of females are affected.

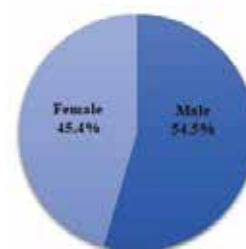
The dental caries index taken gave the result of 40 caries free children, eleven children having score 1, eleven children having score 2, nine children having score 3, ten children having score 4, two children having score 5, two children having score 6, one child having score 7, three children having score 8 and one child having score 10. Among the 40 caries free children, 6

yr old children contributes 17.5%, 7 year old children contributes 22.5%, 8 year old children contributes 12.5%, 9 year old children contributes 7.5% and 10 year old children contributes 40%. The highest DMFT was scored by a 6 year old female and also it has been found that males are more prone to caries than females showing 56% males affected by dental caries and 44% of females affected by dental caries.



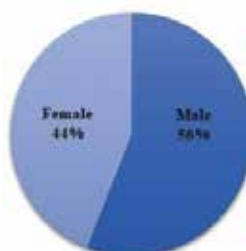
Graph No.1: Dental Fluorosis Index

### Prevalence of dental fluorosis



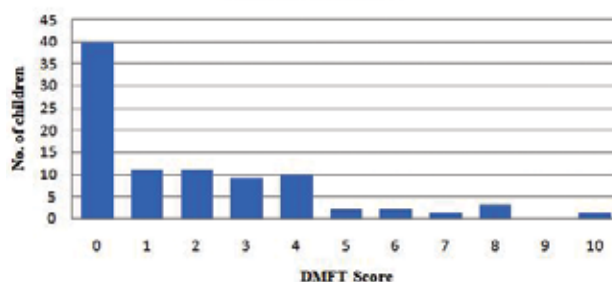
Pie Chart No.1: Prevalence of dental fluorosis

### Prevalence of dental caries

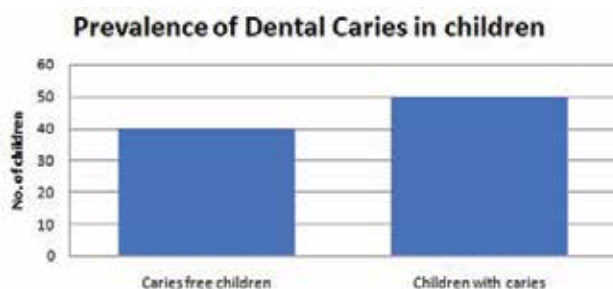


Pie Chart No.2: Prevalence of dental caries

### DMFT Index



Graph No.2: DMFT Index



Graph No.3: Prevalence of dental caries in children



Figure 1: Dental fluorosis



Figure 2: Dental fluorosis affecting anterior teeth

## DISCUSSION

Sivakasi is located to east of the Western Ghats and it consists of charnockite, quartzite, pegamatite, laterite, and sandstone. Alluvial soil in this area acts as a good aquifer along the Vaippar and Gundar river beds, which are major sources of water supply to the villages. The borewells are drilled to a depth of 40-70 m. Due to the nature of the rocks and weathering, fluoride ions leach out into groundwater aquifers. The dissolution of apatite or fluorapatite minerals from charnockite rocks releases the fluoride into groundwater. According to S.Manimegalai and L.Muthulakshmi, the fluoride ion concentration in Sivakasi is found to be 1.8 mg/L<sup>(9)</sup>.

Considering these data, our curiosity led to this study. This study showed 19% of children affected by dental fluorosis and 55.5% of children affected by dental caries. According to Ashish Bhalla, 18% of Kanpur children were affected by dental fluorosis out of which 53.9% are males and 46% are females<sup>(6)</sup>. While in our study 54.5% are males and 45.4% are females. Our study slightly differs from a study done by Monica Chaudhry in Greater Noida, Uttar Pradesh which shows 21% of

children affected by dental fluorosis. But in this study, prevalence in females(51.7%) is higher compared to males<sup>(10)</sup>. Another study done by Saravanan in Cuddalore district is similar to our study in that prevalence of dental fluorosis is more in 8 and 9 year old children comparatively. It shows 35.9% of 8 year old children and 38% of 9 year old children are affected by dental fluorosis while in our study it is 27.2% of 8 year old children and 22.7% of 9 year old children are affected<sup>(5)</sup>.

According to a research done by Jayashri Prabakar in 2016, 47.3% of children are affected by dental caries while in our study it is 55.5% children<sup>(11)</sup>. A study done in RBI Staff Quadrant School, Chennai by Nausheen Mobeen, in which females(63%) have more prevalence of caries than males(37%)<sup>(12)</sup>. This is in contrast with our study in which males(56%) are more prevalent compared to females(44%). A research done by Naziya in Chennai school is similar to our study where 54% of males were more affected than 46% of females<sup>(13)</sup>. Ramachanran Karunakaran's study has increased prevalence of dental caries ranging 65.88% which was conducted in Nammakal District of Tamilnadu<sup>(14)</sup>.

## CONCLUSION

This study was done to know the prevalence of dental caries and dental fluorosis among primary school children in Sivakasi consuming bore well water. The study concluded that 19% of children are affected by dental fluorosis and 55.5% of children affected by dental caries. Dental caries still remains as a major oral health issue among children. Thus awareness based programs should be conducted as well as educating the parents is also necessary for preventing dental fluorosis. As a dentist it is our duty to create awareness in the society to prevent the occurrence of dental caries and dental fluorosis.

**Ethical Clearance:** Taken from institutional ethical committee

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Prevalence of Reproductive Tract Infections and Treatment Seeking Behavior among Women of 15-49 Years Age Group in Haldwani Block, District Nainital, Uttarakhand, India

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## ABSTRACT

**Background:** Reproductive Tract Infections are one of the major public health problems in India, and have a huge impact on the lives of women and men along with their families and communities.

### Objectives:

1. To estimate the prevalence of RTI among married women in the age group of 15-49 years.
2. To assess the pattern of treatment seeking behavior among women with symptoms of RTI.

**Methods:** Cross-sectional study design was used to investigate RTIs in 30 villages of Haldwani block, district Nainital, with 30 cluster sampling technique.

**Results:** Out of 450 women interviewed, 145 of them were found to be suffering from RTIs resulting in a prevalence of 32.2%. Out of 145 symptomatic women, only 14.5% reported that they received treatment while 85.5% did not receive any treatment.

**Conclusion:** The study showed a high prevalence of RTI but poor treatment seeking behavior among the study participants.

**Keywords:** Reproductive Tract Infections, Treatment seeking behavior, Syndromic approach

## INTRODUCTION

Reproductive Tract Infections (RTIs) are one of the major public health problems in India. Generally presenting as 'silent' epidemic, RTIs have a serious impact on women, their families and communities<sup>1</sup>. Untreated RTIs can result in infertility, ectopic pregnancy, chronic pelvic pain, miscarriage, increased risk of HIV infection, cervical cancer and even death<sup>2</sup>.

Globally each year, there are estimated 357 million new infections with 1 of 4 STIs: chlamydia (131 million), gonorrhoea (78 million), syphilis (5.6 million), trichomoniasis (143 million)<sup>3</sup>. In 2014 the estimated cases in India were about 37,269 cases of syphilis and 74,390 cases of gonorrhoea<sup>4</sup>. NFHS-4 & DLHS-4 reported 23.5% & 10.9% prevalence of RTIs/STIs respectively<sup>5</sup>. The scenario of the prevalence of RTIs in Uttarakhand, according to a study done in Dehradun was 13% (Aggarwal et al. 2011)<sup>6</sup>.

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## AIM & OBJECTIVES

1. To estimate the prevalence of RTI among married women of 15-45 years age group.
2. To assess pattern of treatment seeking behavior of symptomatic women.

## MATERIALS AND METHOD

The present study was a community based cross sectional study done in Haldwani block of district Nainital in the state of Uttarakhand conducted for a period of one year from September 2016 to August 2017.

**Study Subjects:** The study subjects were all married women from age group 15-49 years residing in Haldwani block of district Nainital in the state of Uttarakhand. Women who refused to participate, with missed periods at the time of study, widow, divorcee, separated, undergone hysterectomy, with a history of drug allergy, recent antibiotics intake, bleeding per vaginum and having systemic disease and who could not be contacted even after two visits were excluded from the study.

**Sample Size:** The sampling procedure adopted was 30 cluster sampling. Sample size was calculated by using the formula for indefinite population [ $n = 4pq/d^2$ ] by taking the prevalence of RTIs to be 23 %<sup>5</sup> and permissible error of 5%. After applying design effect of 1.5 and adding 10% non-response rate the final sample size came out to be 450.

**Sampling Technique:** Two stage sampling technique was used taking village as primary sampling unit. In Haldwani block there are 252 villages or clusters, list of which was obtained from the tehsil. Out of these, 30 villages or clusters were selected randomly using the lottery method. From each selected village or cluster, 15 households were selected using simple random sampling. One reproductive female from each selected household was interviewed. If there were more than one eligible woman in the household, one was selected randomly by using lottery method. Two repeat visits were made if the required female was not found at first visit.

**Data Collection:** Data was collected after taking informed verbal consent from the participants, by means of a pre-designed, pre-tested and semi-structured questionnaire covering information regarding socio-demographic profile & treatment seeking behavior of women for RTIs symptoms. Interview of eligible woman was followed by general examination, visual inspection of external genitalia and per abdomen examination.

**Data Analysis:** Data was entered and analyzed using SPSS software version 21 for windows. Syndromes were defined as per given in World Health Organisation, Training Modules for the Syndromic management of Sexually Transmitted Infections<sup>7</sup>.

## RESULTS

**Table 1: RTI prevalence since last 1 month**

Presence of RTI	Number (N)	Percentage (%)
Yes	145	32.2
No	305	67.8
<b>Total</b>	<b>450</b>	<b>100.0</b>

It was observed that, out of 450 study participants, 145 women were suffering from RTIs giving a prevalence of 32.2%.

**Table 2: Socio-Demographic Profile of the Study Subjects (N = 450)**

Socio-demographic Characteristics	Number (N)	Percentage (%)	
Age group (years)	15-19	28	6.2
	20-24	86	19.1
	25-29	106	23.6
	30-34	91	20.2
	35-39	67	14.9
	40-44	40	8.9
	45-49	32	7.1
Education	Illiterate	156	34.7
	Primary	87	19.3
	Middle	57	12.7
	High school	49	10.9
	Intermediate	55	12.2
	Graduate and above	46	10.2
Occupation	Unemployed/ Housewife	416	92.4
	Employed	34	7.6
Socio-economic Status*	Class I	51	11.3
	Class II	123	27.3
	Class III	119	26.5
	Class IV	149	33.1
	Class V	8	1.8

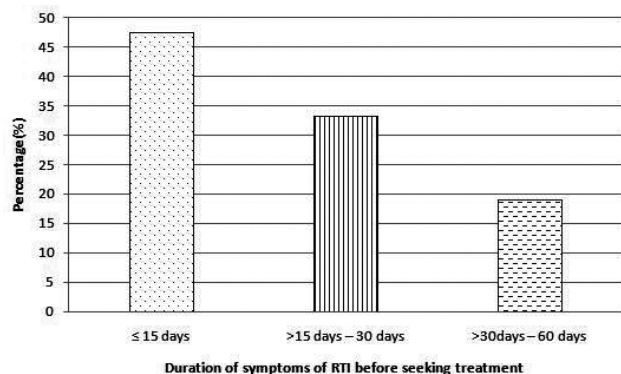
\* Modified BG Prasad Classification, updated 2016

Table 2 showed that majority (23.6%) of the study participants were in the age group of 25-29 years, illiterate (34.7%), unemployed/housewife (92.4%) and belonged to socioeconomic Class IV (33.1%).

**Table 3: Distribution of symptomatic women with RTI and their health seeking behavior**

Health care seeking behavior	Number of RTI cases	
	Number (N)	Percentage (%)
Sought some treatment	21	14.5
Not sought any Treatment	124	85.5
Total	145	100.0

Table 3 depicts that out of 145 women with symptoms, only 14.5% reported that they received treatment, while 85.5% did not received any treatment.



**Figure 1: Distribution of women with duration of symptoms of RTI before seeking treatment**

Fig. 1 shows that maximum (47.6%) women sought treatment within ≤ 15 days while 52.4% women sought treatment after 15 days. Median duration of symptoms of RTIs before seeking treatment was 20 days.

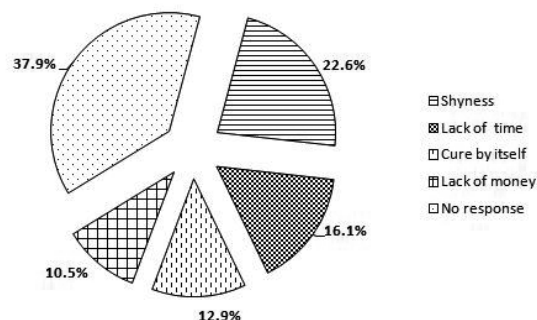
**Table 4: Distribution of Sources of treatment preferred by Symptomatic women**

Variable	Category	Number of RTI cases	
		Number (N)	Percentage (%)
*Sources of T/t preferred	Home Remedies	6	28.6
	Allopathic doctor	13	61.9
	Ayurvedic	11	52.4
	Chemist shop	2	9.5
	Traditional healers/ Quacks	7	33.3

\*Multiple responses

Table 4 shows that the maximum (61.9%) symptomatic women went to allopathic doctors for treatment followed by Ayurvedic (52.4%), traditional healers/ Quacks (33.3%), chemist shop (9.5%). Home remedies were preferred by 28.6% women.

**Reasons for not seeking health care (N=124)**



**Figure 2: Distribution of symptomatic women with RTI and the reasons for not seeking health care**

Fig. 2 depicts that maximum (37.9%) symptomatic women stated no reason while reasons stated by 62.1% women for not seeking treatment were shyness, lack of time, cure by itself & lack of money

## DISCUSSION

The mean age of study participants was found to be 30.1±7.9 years. Age group 25-29 years constituted the majority of study subjects (23.6%) followed by 30-34 yrs age group (20.2%). Similar findings were observed by Saluja N et al<sup>8</sup>, Bote MM et al<sup>9</sup> & Thekdi KP<sup>10</sup> et al in their study who found that majority of the study participants were in the age group of 25-29 years. However, Sreelatha CY et al<sup>11</sup>, Rizwan SA et al<sup>12</sup>, Mamta et al<sup>13</sup>, Mani G et al<sup>14</sup> reported that maximum participants in their study belonged to age group of less than 25 years.

The proportion of illiterates was found to be 34.7% in present study; total percentage of literates being 65.3%, which is comparable to the literacy status of females (70.01%) in Uttarakhand population as shown in census 2011.<sup>21</sup> This value is lower than those collected in other studies conducted by Rasheed N et al<sup>16</sup> in Delhi (83.5%), GK Ratnaprabha et al<sup>22</sup> in Bangalore (78.5%) & Bhilwar M et al<sup>19</sup> in North-East Delhi (72.8%) who reported comparatively higher percentage of literates. This variation may be because the later studies were conducted in major metropolitan cities of India having a higher literacy status.



Majority (92.4%) of study subjects were found to be unemployed/housewives and merely 7.6% were engaged in some form of employment. The number of unemployed females/housewives in studies done by Bhilwar M et al<sup>19</sup>, Mathew L et al<sup>18</sup>, Mani G et al<sup>14</sup>, S Anitha et al<sup>20</sup>, Mamta et al<sup>13</sup>, Meher S et al<sup>17</sup> & GK Ratnaprabha et al<sup>22</sup> were 88.9%, 82.7%, 80.8%, 79%, 76.7%, 70.3% & 60.2% respectively.

It was seen that maximum (34.9%) study subjects belonged to socio-economic Class IV & V. Bote MM et al<sup>9</sup>, G. K. Ratnaprabha et al<sup>22</sup>, Kumar PV S et al<sup>23</sup>, Thekdi KP et al<sup>10</sup> & Rasheed N et al<sup>16</sup> also reported that majority of study participants belonged to lower socio-economic class.

In our study, the overall prevalence of RTI in reproductive age group was found to be 32.2% which was similar to the prevalence found in a study by Sreelatha CY et al<sup>11</sup>, S Anitha et al<sup>20</sup>, Mani G et al<sup>14</sup> & Rasheed N et al<sup>16</sup> i.e. 32%, 32.2%, 33.3% & 34.5% respectively. Use of same methodology as these authors can be held responsible for this. Saluja N et al<sup>8</sup>, Bhatia R et al<sup>24</sup> & Bote MM et al<sup>9</sup> reported 13.19%, 45.6% & 50% prevalence of RTI in their respective studies. This variation may be because of use of different methodology and definitions in their studies.

The treatment seeking for RTI was found to be poor in our study. It was found that out of 145 women with symptoms, only 14.5% reported that they received treatment which was lower than studies conducted by Garg S et al (27.8%)<sup>25</sup>, Bhandari MN et al (33.3%)<sup>26</sup>, Philip PS et al (35.6%)<sup>27</sup>, Rizwan SA et al (40%)<sup>12</sup>, GK Ratnaprabha et al (45.2%)<sup>22</sup>, Chakrabarty S et al (49%)<sup>28</sup> & Mathew L et al (63.9%)<sup>18</sup>. This may be due to lack of awareness as majority of women in our study were illiterate and also this was again a pointer to the fact that reproductive health problems were not perceived as abnormal and requiring medical attention. Median duration of symptoms of RTI before seeking treatment was 20 days which was comparable to the study done in Pakistan who reported that over 53% waited for 7-30 days before seeking treatment. In our study majority (61.9%) of the women had taken allopathic treatment followed by ayurvedic treatment (52.4%). The study findings were comparable to study done by Kaur S et al<sup>18</sup> & Bhilwar M et al<sup>19</sup> who also reported that maximum women visited to allopathic doctors for treatment.

About 85.5% symptomatic women who did not seek treatment had their reasons. Some of them reported that

they were feeling shy in explaining symptoms to family members as well as doctor (22.6%). One of the reason was 'lack of time' as they were busy in their routine work (16.1%). Some of them considered it a minor problem which cure by itself (12.9%). Lack of money (10.5%) was also stated while majority of the women (37.9%) stated no reason.

## CONCLUSION

Prevalence of RTI in study population was 32.2%. On assessing the treatment seeking behavior of 145 symptomatic women, only 14.5% reported that they had received treatment, while 85.5% did not receive any treatment. The median duration of symptoms of RTI before seeking treatment was 20 days. With regard to preference of treatment, 61.9% of symptomatic women went to allopathic doctor. Among women who did not sought treatment, majority (37.9%) of symptomatic women did not state any reason behind not seeking treatment while shyness (22.6%) was reported as second common factor among women who did not sought treatment.

## RECOMMENDATIONS

This study showed a high prevalence of RTIs and poor treatment seeking behavior among the study participants. This high burden could be attributed to two reasons i.e. failure to prevent the occurrence of new cases and failure to identify and effectively treat the prevalent cases. Two possible ways of reducing the failure of the health system in terms of preventive measures are awareness generation and curative measures such as effective and holistic treatment.

**Conflict of Interest:** Nil

**Source of funding:** Nil

**Ethical Approval:** Ethical approval was taken from institutional ethical committee of Government Medical College, Haldwani.

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# Sustainable Agriculture and of Irrigation Practices in India

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## ABSTRACT

Agriculture is the mainstay of Indian economy. The share of agriculture in terms of domestic product has come down to about 12 per cent in 2014-15, while its share in employment and providing livelihood is still quite considerable, as more than 50 per cent of the population depends on this sector. Thus, it becomes paramount to improve upon the status of agriculture in order to increase the income level and thereby the living standard of the rural population. In this sense, stable growth of agriculture possesses the key for a balanced and more inclusive growth of the economy. Stable growth of agriculture necessitates consistent growth of irrigation potential in the country, since the sector is still remaining a 'gamble of monsoon'. In this chapter, the development of irrigation is analysed at both the national level and also in Tamil Nadu.

**Keywords:** *Domestic Product, Employment, Growth of Agriculture.*

## INTRODUCTION

Water is a major factor constraining agricultural development, especially in a developing country like India and there has been much discussion on how to use economic instruments to allocate irrigation water in an efficient, equitable and sustainable manne. As a result, policy makers find it difficult to formulate suitable water pricing policies and design other institutional reforms to meet the increased water requirements of the farmers, and to recover the full cost. Becomes vital in the process of deciding the economic viability of new irrigation projects (Joshi et al, 2003).<sup>1</sup>

Allocation of the scarce resource. Both under pricing of water and lack of cost recovery mechanisms in government managed irrigation systems had resulted in poor operation and maintenance. One strategy is to reduce water demand by adopting water conservation programs and improving water use efficiency, while another strategy involves a water pricing policy. This policy has the advantage that the income could be used to finance developments like the operation and maintenance of irrigation system. Pricing of water can also be considered as a pre-requisite for sustainable use of water resources.<sup>2</sup> The underlying principle of irrigation water pricing in relation to sustainability concerns is that it should reflect the benefits forgone in the future from using a unit of water today which refers to the opportunity cost of irrigation water (Rajapure and Kothari, 2016).

**Sustainable of Agriculture:** Agricultural sustainability implies the maintenance of the quantity and quality of agricultural produce over very long periods of time. Apart from good seeds, agricultural productivity depends on soil health, irrigation water quality and quantity. Two-thirds of India's agriculture is in rain fed areas and therefore, agriculture is referred to as a 'gamble with monsoon'. In more recent years, monsoon has become even more erratic on account of possible climate change-induced vagaries. On the other hand, over use of water mainly due to free or low cost electricity has resulted in exploitation of water resource.<sup>3</sup> Exploitative agriculture offers great danger if Irrigation without arrangements for drainage would result in soils getting alkaline or saline (Ministry of Agriculture, 2010).

Unscientific tapping of underground water will lead to the rapid exhaustion of this capital resource.<sup>4</sup> Water is considered as the most critical resource for sustainable agricultural development worldwide. The sustainable use of irrigation water is a priority for agriculture in arid areas, which can be done through better water management techniques. Better management usually refers to improvement of water allocation and/or irrigation water efficiency with the help of scientific methods of water application that includes drip irrigation and sprinkler irrigation (World Bank/Government of India, 2006).<sup>5</sup>

**Irrigation Practices and Agricultural Development:** As a result, policy makers find it difficult to formulate suitable water pricing policies and design other institutional reforms to meet the increased water requirements of the farmers, in irrigation water becomes vital in the process of deciding the economic viability of new irrigation projects (World Resources Institute, 2009).<sup>6</sup>

Given India's unique food security policy, there is a growing need to manage water for agriculture. Given the political economy of growth based on urbanization and industrialization, there will be a greater pressure to allocate an increasing quantum of water for industrial and municipal uses (Dhawan, 2002). This will pose a threat to food security at the aggregate level. The problems would be acute in semiarid Gujarat, Tamil Nadu, Rajasthan and Maharashtra, which also experience ever increasing demand for water in all sectors. Land degradation would add to the challenges. Mainly, food security of the poor will be at risk, as they would face severe resource constraints not only in accessing water,

but also in investing in land and water management (Bhatty, 2007).<sup>7</sup>

**Source-Wise Irrigation In India:** The changing trends in the different sources of irrigation in an area explains the effort taken by the Government in augmenting the irrigation potential over the years and also the way in which the pattern has undergone changes. Table – 1 provides the data pertaining to the source-wise irrigation in India since 1950-51.

It is inferred from the table that the proportion of area under canal irrigation has increased from 39.78 per cent in 1950-51 to 42.05 per cent in 1960-61, but has declined continuously since then and came down to the level of 24.64 per cent in 2010-11. The total area under canal irrigation has however, increased initially from 8.30 mha in 1950-51 to 17.45 mha in 1990-91, then declined consistently and came down to 15.67 mha in 2010-11. The area under tank irrigation has declined in both absolute and proportion-wise over the period.<sup>8</sup> the total area, though has increased initially from 3.61 mha in 1950-51 to 4.56 mha in

**Table 1: Source-wise Irrigation in India, 1950-51 to 2010-11\***

Year	Canals	Tanks	Tube Wells	Other Wells	Others	NIA
1950-51	8.30 (39.78)	3.61 (17.33)	Nil	5.98 (28.67)	2.97 (14.23)	<b>20.85 (100)</b>
1960-61	10.37 (42.05)	4.56 (18.49)	0.14 (0.55)	7.16 (29.01)	2.44 (9.89)	<b>24.66 (100)</b>
1970-71	12.84 (41.28)	4.11 (13.22)	4.46 (14.34)	7.43 (23.88)	2.27 (7.29)	<b>31.10 (100)</b>
1980-81	15.29 (39.49)	3.18 (8.22)	9.53 (24.62)	8.16 (21.08)	2.55 (6.59)	<b>38.72 (100)</b>
1990-91	17.45 (36.34)	2.94 (6.13)	14.26 (29.69)	10.44 (21.73)	2.93 (6.11)	<b>48.02 (100)</b>
2000-01	15.97 (28.96)	2.46 (4.45)	22.57 (40.94)	11.26 (20.42)	2.89 (5.23)	<b>55.08 (100)</b>
2001-02	15.27 (26.88)	2.19 (3.86)	23.24 (40.93)	11.73 (20.66)	4.36 (7.68)	<b>56.67 (100)</b>
2002-03	14.04 (26.17)	1.80 (3.36)	23.48 (43.76)	10.66 (19.87)	3.67 (6.83)	53.78 (100)
2003-04	14.45 (25.31)	1.96 (3.43)	26.69 (46.75)	9.69 (16.97)	4.30 (7.53)	<b>57.09 (100)</b>
2004-05	14.77 (24.94)	1.73 (2.92)	25.23 (42.60)	9.96 (16.82)	7.54 (12.73)	<b>59.23 (100)</b>
2005-06	16.72 (27.48)	2.08 (3.42)	26.03 (42.78)	10.04 (16.50)	5.97 (9.81)	<b>60.84 (100)</b>
2006-07	17.03 (26.84)	2.78 (4.38)	26.94 (42.46)	10.70 (16.86)	6.00 (9.46)	<b>63.45 (100)</b>
2007-08	16.75 (26.51)	1.97 (3.12)	28.50 (45.10)	9.86 (15.60)	6.11 (9.67)	<b>63.19 (100)</b>
2008-09	16.88 (26.52)	1.98 (3.11)	28.37 (44.58)	10.39 (16.33)	6.02 (6.46)	<b>63.64 (100)</b>
2009-10	14.98 (24.18)	1.58 (2.55)	28.38 (45.82)	9.99 (16.13)	7.01 (11.32)	<b>61.94 (100)</b>
2010-11	15.67 (24.64)	2.00 (3.14)	28.55 (44.89)	10.51 (16.53)	6.87 (10.80)	63.60 (100)

**Note:** Figures in Million Hectares and those in brackets are percentage to NIA. NA–Not Available.

\*Irrigation data is available only upto 2010-11.

Source: Agricultural Statistics at a Glance, 2015, Govt. of India.

1960-61, it has declined since then and has come down to 2 mha in 2010-11. Its share in NIA has gone up

from 17.33 per cent in 1950-51 to 18.49 per cent in 1960-61, but has decreased to 3.14 per cent in 2010-11. In

the absence of any concerted efforts by the Government in enhancing the role of canal and tank irrigation in the country over the years, the structure of irrigation has shifted towards well irrigation and especially towards tube well irrigation.<sup>9</sup> This also implies the fact that augmenting the extent of irrigation has been left to the poor farmers, as the state has been withdrawing from the same. In 1950-51, tube well irrigation was not known much in the country, as it has no share in the NIA. In 1960-61, tube well irrigation was practised to the extent of 0.55 per cent of the NIA, which has increased to 44.89 per cent in 2010-11. In the same way, the total area under tube well too has increased from 0.14 mha in 1960-61 to 28.55 mha in 2010-11.<sup>10</sup>

There has been a similar trend in the expansion of irrigation by other wells which include open or surface wells. Its total area has gone up from 5.98 mha in 1950-51 to 10.51 mha in 2010-11. The proportion of area under the irrigation of other wells, however, has declined from 28.67 per cent in 1950-51 to 16.53 per cent in 2010-11. This indicates that though the pattern of irrigation has moved in favour of well irrigation, within well irrigation, open or surface wells cannot be sustained in the long run, since it should be dug deeper in every passing year. This forces the farmers, especially those who can afford, to shift towards tube well irrigation. This method of irrigation is not only highly expensive, but also highly unsustainable in the long run, as it should also be dug deeper and in that process, drives away the neighbouring small and marginal farmers, for whom the water table becomes 'unreachable'. The proportion of area under other sources like streams and other water ways has accounted for 14.23 per cent in 1950-51, which has declined sharply to 5.23 per cent in 2000-01, but has also increased equally sharply to 10.80 per cent in 2010-11. This suggests that the basic structure of irrigation in the country has undergone major shift over the years. The combined share of canal and tank irrigation which was more than 50 per cent until 1970-71, has given way to well irrigation (both tube well and surface well) in the later period, as it now accounts for more than half of the NIA in India.

**Sustainable Water Management:** It considers conservation of all water resources using appropriate technologies and their use with social acceptability, economic viability, and eco-friendliness. Under the head of social acceptability, cross subsidization of available

water needs to be made into legitimate interregional (rural versus urban) and inter-sectoral (agricultural versus industrial) needs. Such considerations ahead of the scarcity will provide flexible practices in irrigation management (Goal et al, 2014). Otherwise, politically oriented and ill-considered decisions tend to aggravate human sufferings, cattle perishing, agricultural stagnation or decline and reduced industrial output, cumulatively affecting GDP adversely.<sup>11</sup>

Under aridity, consideration of low moisture carrying capacity of the ecosystem in right perspective needs irrigation in small dosages and at higher frequency so that immediate hardships out of aridity are minimized (Sarwar and Bastiaanssen, 2001). This is a case of moderate contingency arising out of water scarcity.<sup>12</sup>

Drought being a natural, but temporary imbalance in the availability of moisture caused by lower than the average rainfall over the years, its uncertain frequency, limited duration and severity of sunlight aggravate the rate of evapo-transpiration, resulting into diminished moisture availability for plants to sustain. Severity of such situation needs application of soil conditioner (Chaudhari and Kothari, 2009) and DI at night time so that due to water-holding capacity of the soil conditioner, crop is sustained at a minimal loss due to evapo-transpiration, providing the hope of livelihood, especially for rural and economically weaker population. This is a case of immediate contingency due to acute water scarcity (Pereira, 1999).

Desertification in a large measure is man-made problem over longer duration, carried forward from the past in the availability of water. While drought aggravates desertification, recycling of water for human and cattle consumption and recycling for irrigation provides a workable strategy to arrest the rate of desertification and thereby human hardships.<sup>13</sup>

## CONCLUSION

Water scarcity has huge implications for health, hygiene, sanitation, drinking water, agriculture and industry. Therefore, equitable distribution of this scarce resource has been accorded prime consideration in form of sustainable irrigation, which serves as a springboard to provide food for public consumption as well as industrial raw materials. For this purpose, central, state, district and local (village level) governments have

ensured voluntary public code of conduct to minimize the risk of over use of underground reservoirs and protect their water quality. Therefore, water extraction, conveyance, storage and delivery infrastructure is Agriculture being the major user of water, besides reliance on rain-fed irrigation, gradually surface or flood irrigation is being replaced by sub-surface micro irrigation, which has inherent capacity to double the acreage under irrigation, without loss to agricultural output. To reduce water use and transform saline soil into a productive matrix, sustainable water management is made through the enhanced use of farmyard manure, soil conditioner, which permit reduced use of water and at the same time soil fertility, is enhanced over 3-4 year duration. Everything said and done, the ultimate success of irrigation practices depends on certain regulatory measures by the government and public participation through keen awareness.

**Ethical Clearance:** Yes

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# A Study to Assess the Knowledge Regarding Cervical Cancer Screening and Prevention among Women in Rural Areas in Trichy

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## ABSTRACT

**Background:** Most of the cervical cancer cases are diagnosed late leading to poor outcomes. Very few studies have explored the awareness, screening and prevention among women in reproductive and perimenopausal age group about cervical cancer in India. Hence this study was conducted with the objective of knowing the knowledge of women about cervical cancer, its risk factors & preventive measures.

**Method:** A primary health center based Cross-sectional Study was conducted among the women attending the outpatient department of PHC in Pullampadi and RHTC in Sangaenthi in Trichy district during the period December 2017 to February 2018. A total of 300 study subjects were included in the study. A Pre-tested, semi structured questionnaire was developed and it was administered to women in language of their preference. Data was entered and analyzed using SPSS v. 15.

**Results:** A majority 68% of women had poor knowledge about cervical cancer and its screening. None of the study subjects had undergone screening or had been vaccinated. Whatever little knowledge the women had was obtained from mass media.

**Conclusion:** Majority of women had poor knowledge. Mass media could be used to educate the women. There is a need to conduct community based study to know the practices of doctors and asses if they are educating and offering suggestions for screening.

**Keywords:** cervical cancer, knowledge, screening, Vaccination, Symptoms

## INTRODUCTION

Cervical cancer is one of the most common cancers worldwide. In India, it is one of the leading causes of mortality among women accounting for 23.3% of all cancer deaths.<sup>[1]</sup> India accounts for about 20% of cervical cancer cases reported from the world.<sup>[2]</sup> More than three-fourth of these patients are diagnosed in advanced stages leading to poor prospects of long term survival and cure.<sup>[2]</sup> Early detection of cervical cancer is possible with pap smear tests. The proportion of women who undergo pap smear testing ranges from 68% to 84% in developed countries as compared to India where the rates range

from 2.6% to 6.9% among women in communities.<sup>[3-6]</sup> It has been found that, in many developed countries, annual incidence and prevalence of cervical cancer has decreased by 50 to 70% after introduction of Population based screening.<sup>[2]</sup> So, if women in India undergo screening for cervical cancer, it is possible to detect cervical cancer in early stages, thereby reducing mortality and morbidity. Screening would be broadly influenced by Knowledge about cervical cancer, its screening among women. Role of health care providers who come in contact with women in hospitals and the sources of information. Facilities available and the awareness of facilities.

Hence, this study was undertaken to know the knowledge about cervical cancer, screening facilities among women attending OPDs of sangenthi and pullambadi RHTC and PHC respectively. It was planned that after the data collection, the women would be educated about cervical cancer, its screening methods and the facilities available for screening in the hospitals.

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## METHODOLOGY

A primary health center based cross-sectional study was conducted among women aged between 18 to 60 years, who attended Outpatient department of primary health center, Sangenthi and Pullambadi in Trichy district of Tamil Nadu. The study was conducted during December 2017 to February of 2018. A Pre-tested, semi-structured questionnaire was devised containing various components of sociodemographic profile like age, occupation, educational status, knowledge about cervical cancer & Screening was applied to assess the study subjects. Only those subjects consenting for the study was included in the study. Those below 15 years & above 60 years and also non-consenting women were excluded from the study. During the study period around 300 study participants were interviewed by using the questionnaire and data entered and results analysed using SPSS v.15.0. Each of the knowledge based questions about cervical cancer was assessed if they had heard about cervical cancer. The questionnaire mainly consisted of Symptoms/manifestations of cervical cancer, Risk factors, screening and vaccination for cervical cancer.

**Informed Consent and Ethical Clearance:** Study protocol was approved by institutional ethical committee. The women were approached in OPD and invited to participate in the study. The nature and purpose of the study was explained and consent sought. It was made clear that participation in study is voluntary.

**Service Component:** After the collection of data the women were informed about the cervical cancer, the importance of screening and facilities available for it. Implications of positive and negative results were explained.

**Stistical Analysis:** The data was entered and analyzed using SPSSv.15.0. Basic subject characteristics were expressed as proportions in appropriate tables.

## RESULTS

The study was conducted among 300 study participants between the age group of 18 to 60 years. Among the study only 96 (32%) of them knew about Cancer Cervix.

**Table 1: Awareness of Cancer Cervix based on Age Category (n = 300)**

Age Category	Total	Awareness	Percentage (%)
18-20 years	9	2	22.2
21-30 years	74	40	54.1

Conted...

31-40 years	90	34	37.8
41-50 years	84	20	23.8
51-60 years	43	0	0
Total	300	96	32

Although the proportion of the people in age group 31-40 years were higher, the awareness was highest among women in the age group of 21 to 30 years (54.1%), whereas none of women in the age group of 51 to 60 years had any awareness.

**Table 2: Awareness based on the literary status (n = 300)**

Literacy Status	Total	Awareness	Percentage (%)
Illiterate	92	2	2
Primary	42	3	7.1
Secondary	28	2	7.1
High School	52	9	17.3
Diploma	9	5	55.5
Graduate	77	75	97.4

The Awareness regarding cervical cancer increased with increase in educational status. Hence, the highest level of awareness was seen among graduates and least among illiterates.

**Table 3: Awareness based on occupational category**

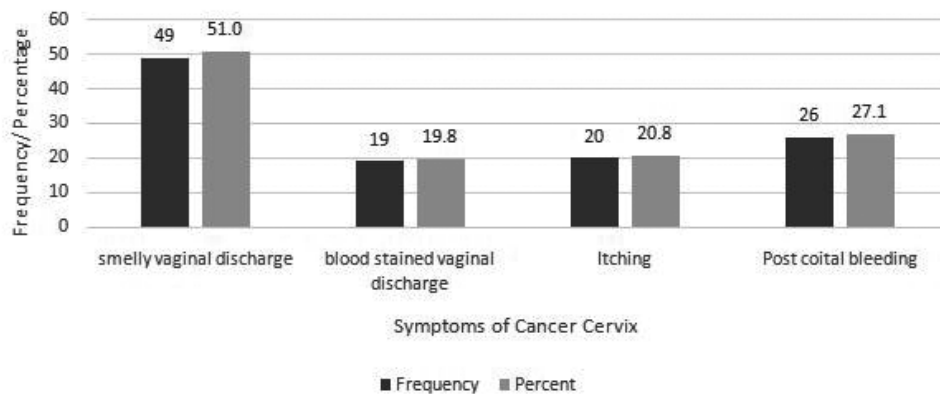
Occupational Category	Total	Awareness	Percentage (%)
Professional	8	2	25
Semi-professional	36	35	97.2
Clerk, Shop Owners, Farmers	12	7	58.3
Skilled	8	0	0
Unskilled	20	0	0
Unemployed	214	52	24.2

With respect to occupational categories, awareness was highest among the semi-professionals and least among skilled and unskilled.

**Table 4: Awareness based on Risk factor categories**

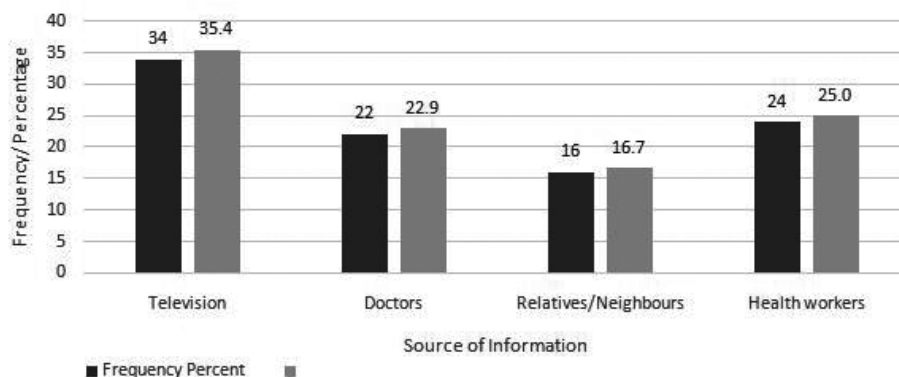
Risk Factors Awareness		Total (n)	Awareness	Percentage (%)
Menstruation History	Participants with Early menarche	13	4	30.8
	Participants with Late menopause	11	0	0.0
Parity	0-2	204	75	36.7
	3-5	88	21	23.9
	6-9	8	0	0.0
Cervical cancer is caused by infection		96	48	50.0
Knowledge about methods of prevention		96	41	42.7
Maintenance of Personal Hygiene		96	37	38.5
Vaccination prevents cervical cancer		96	31	32.3
Ideal age for Vaccination		31	11	35.4
Availability of investigations for diagnosing cancer cx		96	23	24.0
Early detection possible		23	19	82.6
Ideal age of Screening		23	9	39.1

Among the 300 study participants, 13 had risk factor of early menarche and 11 had late menopause. Among those who had early menarche 30.8% had awareness, while none of them with late menopause had any awareness. Women with lesser parity (0-2) had more awareness (36.7%) than those with higher parity. about 32.3% of women had awareness about availability of vaccine to prevent the occurrence of cervical cancer, among these 35.4% were aware of ideal age for vaccination.



**Fig. 1: Knowledge about symptoms of cervical cancer (n = 96)**

Blood stained vaginal discharge, smelly vaginal discharge, itching & Post-coital bleeding were the most common symptoms known by the study population. Nearly half of the those aware of cervical cancer had knowledge of smelly vaginal discharge as symptom of cervical cancer.



**Fig. 2: Main Source of information regarding cervical cancer (n = 96)**

Television and health workers were found to be the major sources of information regarding cervical cancer in comparison to others.

## DISCUSSION

Recently, studies have been reported from India on awareness of cervical cancer and its screening among women [1-8]. Based on the study conducted by Aswathy S et.al.in Kerala 74.5% of the population were aware of the methods of early detection of cervical cancer. Based on the study conducted by Shekhar S et.al. 77% of them knew that pap smear is used for early detection of cervical cancer. Based on the study conducted by Shekhar S et.al., among the women of rural India 69% of the study population had awareness about cervical cancer.70% of those who participated in the study conducted by Shan V among the nursing staff of a tertiary health institute in Ahmedabad had awareness about cervical cancer. Study conducted by Asthana S, proves that 85.5% of women were aware of cancer cervix and its screening methods. Based on the study conducted by Basu P et al in which inspite of the low literacy rate 95% of the women were aware of cancer cervix whereas in our study lower literacy status is associated with lesser awareness. Women's perceptions and social barriers determine compliance to cervical screening- results from population based in India: cancer detect prev. 83% of the women were aware of the fact that cervical cancer screening methods are available and they were willing to undergo such studies, whereas in our study only 32% of women taken into study were aware about cervical cancer. Studies exploring the knowledge of women about cervical cancer are focused on either on "nursing staff" working in hospitals or on women in the rural community[1-5]. Three of these studies, which focused on "nursing staff" have reported good awareness of cervical cancer and its screening, though the proportion of who have ever undergone pap smear ranges from 7-8% respectively.[2-4] where as in our study, though 24% women were well aware of cervical cancer and its screening methods, none had undergone pap smear testing. Two studies which were done on women in rural communities have also reported awareness of about 72% though only 2%-6.9% ever had pap smear test.[1,5] One study among women who attended the outpatient departments has reported low awareness (16%) though 10% had ever received pap test.[6] Another study from India did not provide any information on knowledge or the proportion of women who have undergone pap smear test.[7] A study carried out on college girls, which explored only the knowledge has reported low levels of

awareness (20%).[8]None of the studies have explored the role of the healthcare providers who come in contact with women, sources on information in the context of early diagnosis.

**Conflict of Interest:** None declared

**Source of Funding:** Self

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# Study on Utilization of Breast Feeding Booths in Major Bus Terminals by Lactating Mothers in Selected Districts of Tamil Nadu

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## ABSTRACT

**Introduction:** Breast feeding is the optimal source of infant nutrition. Our government of India and Tamilnadu have taken various steps to promote breastfeeding, one of which was lactating rooms or nursing covers in major bus terminals in Tamilnadu. This project aims at analyzing the utilization of lactating booths by breastfeeding mothers and spreading awareness about breastfeeding booths in bus terminals and making sure that the lactating mothers are comfortable with every aspects.

**Methodology:** It is a cross sectional descriptive study involving major bus terminals in Tamilnadu involving mothers of child less than 2 years of age crossing our study site for a period of one month with sample size of 200 by interviewing them with predesigned semi-structured questionnaire.

**Result:** Among the study population, 71.5% (143) are aware of lactating booths and only 19.5 % (39) of surveyed population is making use of breastfeeding booths, while others are not happy with breastfeeding booths because of various aspects like feeling of insecurity/ shyness, poor infrastructure, use of bottle milk etc. Utilization of lactating booths by breastfeeding mothers has been increased from 38.5% in past one year to 61.5% in past 6 months.

**Conclusion & Recommendation:** Though lactation booths increases the rate of breastfeeding, it can be achieved more by removing the social stigma on breastfeeding and making it more acceptable.

**Keywords:** Breast feeding booths, Privacy, Bus Terminals, Utility, Tamil Nadu

## INTRODUCTION

Breastfeeding is the first fundamental right of the child. Breastfeeding is an important public health strategy for improving infant and child morbidity and mortality, improving maternal morbidity, and helping to control health care costs.<sup>1</sup> The World Health Organization (WHO) and United Nations Children's Fund (UNICEF) recommended that every infant should be exclusively breastfed for the first six months of life, with breastfeeding continuing upto two years of age or longer.<sup>1</sup> Breastfeeding is the unique source of nutrition and it plays an important

role in the growth, development and survival of the infants<sup>2</sup>. Breast feeding also provides health benefits for mother such as reducing postpartum blood loss, prevents breast and ovarian cancer and most importantly it increases the bonding between mother and the child.

TRI CORE interventions related to breast feeding are, 1. Improving lactation support, 2. Enhancing maternal & staff lactation education and 3. Fostering maternal confidence in their ability to breastfeed<sup>3</sup>. Of all health protective interventions, regular breastfeeding of infants under two years of age has the greatest impact on child survival<sup>4</sup>. Breastfeeding has been globally recognized as the measurement indicator for the health outcome of population<sup>5</sup>.

As we are living in the era of migration, travelling is inevitable in our day today life. Barriers to breastfeeding can include obesity, returning to work, poor family support, embarrassment about feeding in public and lack of education<sup>6</sup>. However on a regular basis there is an

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increasing outcry about a mother who has been told to cover up or move away from a public area while she is breast feeding. Discomfort with idea of breast feeding in public has been cited as a reason for some women choosing not to initiate breast feeding or planning a shorter duration of breast feeding. Other women are choosing to express and bottle feed their expressed milk when they are in public. Mothers should feel free to breastfeed whenever they need to. There comes the need for nursing covers.

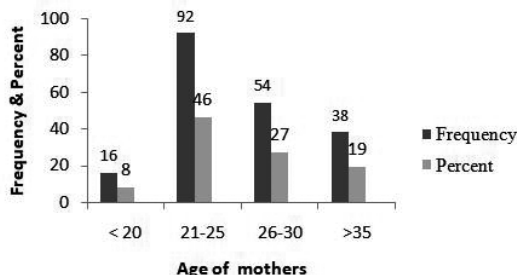
On August 3, 2015, lactating room or nursing covers was introduced in major bus terminals in Tamil Nadu. Overall 352 such lactating rooms were established at various bus terminals all over the state. It has been a year since the scheme has been initiated. The main objective of this study is to assess the current status of the program and the accessibility by the common people, to determine the perceived needs of women who are breastfeeding in lactating room at bus terminals and to identify challenges faced by mothers which are need to be addressed to make breast feeding at public places more friendly.

**METHODOLOGY**

It is a cross sectional descriptive study involving major bus terminals in Trichy, Thanjavur, Nagapattinam which covered mothers of children less than 2 years and who are on travel and about to cross our study site on that particular day. Study period was for one month including a sample size of 200. The study tool was a predesigned semi-structured questionnaire which included demographic details like age and number of children, awareness about lactating booths, facilities and difficulties in the lactating rooms, with the study technique of Interview with breastfeeding mothers. Data was collected, entered and analyzed using SPSS V 15.0 software.

**RESULTS**

The study consisted of interview among 200 lactating mothers who were transiting the bus terminals of Trichy, Thanjavur and Nagapattinam. Among the study subjects, only 71.5% of the study population are aware about the breast feeding booths.



**Figure 1: Distribution of Age Group of Lactating Mothers (n = 200)**

Figure 1 shows about 46% of the breastfeeding mothers are in age group of 21-25 years. Around 65% of the study population breastfeed in public places. Among lactating mothers who used these breastfeeding booths majority of them had single child.

**Table 1: Distribution Of Common Public Breast Feeding Sites Utilized By Lactating Mothers (n = 200)**

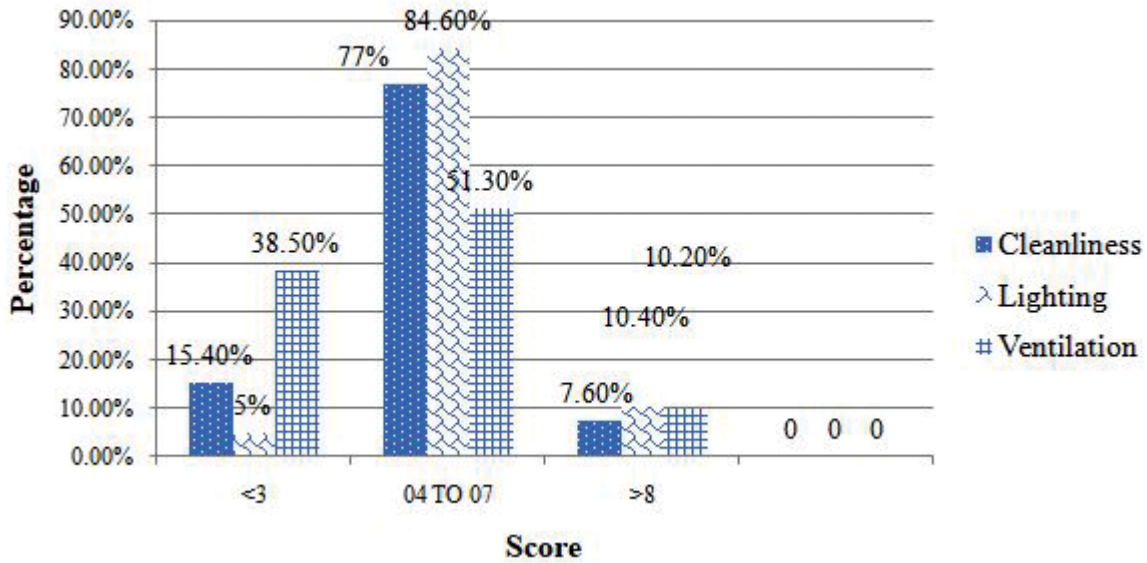
Common Breast Feeding Public Sites	Frequency	Percent
College Campus	2	2.3
Beach	5	3.8
Marriage Hall	5	3.8
Airport	6	4.6
Office	7	5.3
Hotels/Restaurants	7	5.3
Beauty Parlour	8	6.1
Temple/Church	8	6.1
Shopping Centre/Market	11	8.4
Park/Theatres	12	9.2
Railways	14	10.7
Hospital	16	12.2
Bus Stand	29	22.1
Total	131	100

Table 1 shows that majority of travelling lactating mothers commonly use bus stand to breastfeed followed by hospitals and railway stations.

**Table 2: Frequency of Usage of these Booths by Lactating Mothers (n = 200)**

Frequency of Usage of these Booths	Frequency	Percentage
>8 Times/Month	7	4.9
4-8 Times/Month	12	8.4
<3times/Month	20	14
Not At All Used	104	72.7
Total	143	100

Table 2 shows that among travelling mothers who lactate ,72.7% of the people do not use these booths even though they are aware of these booths.



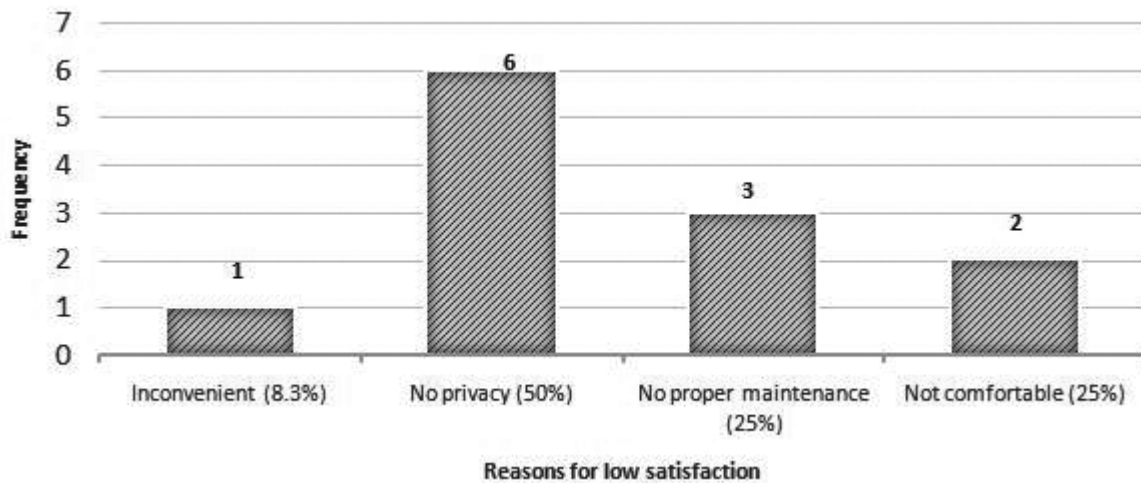
**Figure 2: Scores Given For Cleanliness, Lighting & Ventilation by Lactating Mothers Who Used Breast Feeding Booth**

Figure-2 shows that majority of the lactating mothers gave scores (out of 10) in 0-7 range for cleanliness, lighting & ventilation, which stress the importance of improving the ambience in these breast feeding booths.

**Table 3: Problems Faced By Lactating Mothers in Breastfeeding Booths**

Factors affecting Booth utilisation	YES		NO	
	Frequency	Percent	Frequency	Percent
Facility To Sit	38	36.5%	10	25.6
Privacy Status	20	19.2%	12	30.7
Adequacy Of Breast Feeding (Satisfaction)	19	18.2%	8	20.5
Usefulness Of Booth	27	26.1%	9	23.2

This table shows that lack of privacy is the major problem faced by lactating mothers.



**Figure 3: Reason For Low Satisfaction using Breast Feeding Booths (n =12).**

This ensures that lack of privacy (50%) & lack of proper maintenance (25%) is the major reason for poor satisfaction among lactating women using breast feeding booths.

## DISCUSSION & RESULTS

From the study we conducted among 200 breast feeding mothers, we got the information that out of 200 only 143 are aware of such breastfeeding booths in bus terminals which forms 71.5% of total population. Our main aim is to make every women breastfeed adequately every time irrespective of the place they are in. Out of 143 who are aware of the breast feeding booths only 39 are using it which forms a mere 19%. Only a 2/3 rd (131) of total study population had breastfed in public places while remaining 69 which forms about 34.5% of total study population choose not to breastfeed in public places because of use of bottle milk, insecurity, shyness.

Based on study, besides Bus Terminals other commonly used breastfeeding places were hospitals and railway stations. Out of 200 study population the people utilizing the breastfeeding booth mainly belongs to that 35.5% who are mothers of 1 child .Caretaker should be provided for each breast feeding booth to help mothers travelling alone with more than one child. Mothers who are using these booths for the past 1 year is 15(38.5%) which show drastic increase over the past 6 months which is around 24 (61.5%). Digital banners and placards in and around bus terminals will make this facility visible to everyone.

According to a study by South Asia Infant Feeding Research Network<sup>7</sup> (SAIFRN), exclusive breastfeeding rates were 42.55 in Bangladesh, 46.4% in India and 53.15 in Nepal. The rate of full breastfeeding ranged between 60.6% and 73.9%. There were no factors consistently associated with the rate of exclusive breastfeeding across countries.

Utilization of health services (more antenatal clinic visits) was associated with higher rates of exclusive breastfeeding in India but low rates in Nepal. Delivery at a health facility was a negative determinant of exclusive breastfeeding in India. India has no legal statute dealing with breastfeeding. Prevalence and social acceptance vary from region to region<sup>8</sup>.

In Taiwan, The Public Breastfeeding Act since November 2010 safeguards the right to breastfeed in public, while lactation room are setup to deal with privacy and to provide access to hot water and power supplies, with fines against interfering with a mother's right to breastfeed<sup>8</sup>.

In UK, breastfeeding in public (restaurants, cafes, libraries etc.) is protected under the sex Discrimination Act 1975 under the provision of goods, facilities and services section. If the child is under six months old, the mother has additional protection under a 2008 amendment to the act which protects maternity right. This is superseded by the Equality Act 2010 which clarifies that a business must not discriminate women who is breastfeeding a child of any age in a public place. Her companion(s) are also protected by this act<sup>9</sup>.

## CONCLUSION

The utilization of the breast feeding booths in bus terminals was found to be very low i.e 19% among the study population. Among the 39 study participants, only 69.2% felt that these booths are useful. While the remaining 30.8% had complained about various drawbacks about breastfeeding booths like absence of privacy, inconvenient and no proper maintenance.

## RECOMMENDATION

The problem is that instead of identifying the root cause, we are trying to adjust current stigma of society. The only way to make it happen is that shifting the status of stigma to more acceptable. In addition to organizing breastfeeding booths, government should take initiative to have digital posters and paintings of breastfeeding women around bus terminals, thereby making it more acceptable. In partnership with community members establish minimum criteria for achieving and maintaining breastfeeding friendly status by overcoming the drawbacks of the lactation booths. Conduct future research in the area of breastfeeding friendly environment and workplace.

**Ethical Approval:** Obtained from Institutional Ethical Committee

**Conflict of Interest:** Nil

**Source of Funding:** Self

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# Study to Assess Knowledge, Practice and Attitude of about Self Breast Examination among Women in Field Practice Area of a Medical College in Trichy

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## ABSTRACT

**Background:** Breast cancer is one of the leading causes of cancer mortality worldwide. In spite of benefits of Self Breast Examination (SBE) many women don't even know how to perform it. The study is aimed to assess knowledge, practice and attitude of SBE among women in urban field practice area of Medical College in Trichy.

**Method:** Cross sectional study was conducted among 150 women between 20 years to 60 years in field practice area of Trichy SRM Medical College Hospital & Research Centre. Data was collected using a pre-tested semi-structured questionnaire, the mode of data collection was through interviews. The Data was entered and analyzed using descriptive and analytic statistical methods.

**Results:** The mean age of the respondents was 32 (+/-) 12 with 12.5% of the women aged between 20-34yrs. The proportion of married women was 140 (93.3%). Majority (144) 96% respondents reporting that they do not know about SBE. The commonest symptoms of breast cancer known among those aware were bloody discharge from nipple, pain and presence of masses in the breast. They also believed that it is a deadly disease and person once diagnosed with cancer will eventually lose her life.

**Conclusion:** Health education programmes are needed to create awareness and to encourage and improve women's practice of SBE.

**Keywords:** Breast cancer, Self-breast examination, Knowledge, Practice, Urban Area.

## INTRODUCTION

Breast cancer has been ranked number one cancer among Indian females with mortality 12.7 per 100,000 women. The incidence rate of carcinoma of the breast was 41 per 100,000 women for Delhi, Chennai (37.9), Bangalore (34.4) and Trivandrum (33.7). Mortality-to-incidence ratio was found to be as high as 66 in rural registries whereas as low as 8 in urban registries. Besides this young age has been found as a major risk factor for breast cancer in Indian women<sup>1</sup>. Breast self-exam (BSE), or regularly examining breasts on their own, can be an

important way to find a breast cancer early, when it's more likely to be treated successfully. Not every cancer can be found this way, but it is a critical step you can and should take for self<sup>2</sup>. Though, Substantial support for breast cancer awareness and research funding has helped create advances in the diagnosis and treatment of breast cancer, still many women lack knowledge on SBE being the first easiest step in early detection of cancer.

## METHOD

A community based cross-sectional study was conducted among 150 women in urban field practice of Trichy SRM Medical College Hospital and Research Centre, Trichy from December 1<sup>st</sup> 2017 to January 31<sup>st</sup> 2018. A pre-tested semi-structured questionnaires was used to collect information. The questionnaire obtained information on respondents on sociodemographic characteristics, awareness of Breast Cancer and Self Breast Examination (SBE), barriers to SBE practice,

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practice & knowledge of SBE. Socio demographic variables included: age, education status, marital status etc. Awareness regarding risk factors like family history of breast cancer, previously exposure to mammography, breastfeeding duration etc., were recorded. Breast cancer and SBE awareness questions included: knowledge & practice questions like heard about breast cancer & SBE, procedure of SBE, age for practicing SBE, if they had ever done SBE & frequency of doing SBE etc.

**Data analysis:** The collected data, after checking their completeness entered into SPSS version 15.0 for analysis. Descriptive statistics was used to see frequency, mean, median, standard deviation and percentages of the characteristics.

**RESULTS**

In this study, majority 96% of women in urban field area haven't heard about SBE. Less than 4% women reported practicing it. Mean age of patients in our study population is 31.6 From table 1 we can infer that, 25.8% of women in our study population are graduates, 27.3% of them have completed higher secondary education and 74% have crossed secondary education. 93.3% of women in our study population are married

**Table 1: Age and educational status (n = 150)**

Variable		Frequency	Percentage
Age	20-30	84	57
	31-40	32	22
	41-50	23	15
	51-60	9	5
	61-70	2	1
Education	Illiterate	19	12.7
	Primary School	20	13.3
	Secondary	31	20.7
	Higher Secondary	41	27.3
	Graduate	39	26

Majority (57%) of the study population belonged to the age group between 20-30 years. Only 12.7% of the population were illiterates.

**Table 2: Parity and Breastfeeding Pattern (N = 150)**

Variable		Frequency	Percentage
Parity	*Nullipara	10	6.7
	@Primi Gravida	18	12
	#Para 1	47	31.3
	Para 2	43	28.7
	Para 3	17	11.4
	Para 4	10	6.7
	Para 5	5	3.3

Conted...

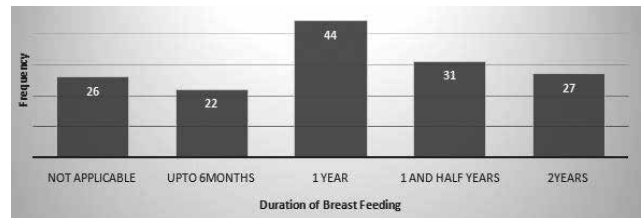
Breastfeeding	Yes	122	82
	No	28	18

\*Nulli para-refers to who have never experienced pregnancy

@Primi-gravida-Refers to women currently pregnant for first time

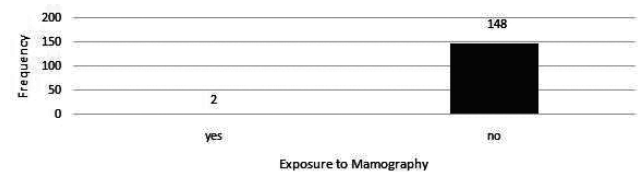
#Para-refers to number pregnancy the women has underwent but not currently pregnant

Majority 93.3% of them had experienced pregnancy atleast once before or during the study period. Around 82% of women in our study population have breast fed their children. Only 8.5% of women in our study population have family H/O breast cancer



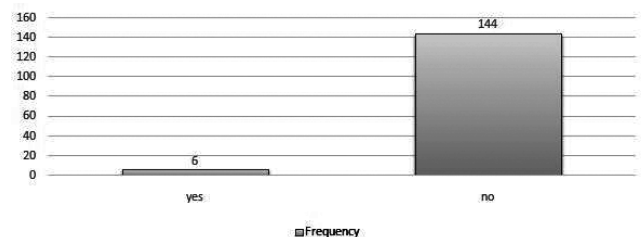
**Fig 1: Duration of Breast Feeding among study subjects: (n = 150)**

29.3% of women in our study population have breastfed their children for 1year,68% have breastfed their children for 1 year and above.



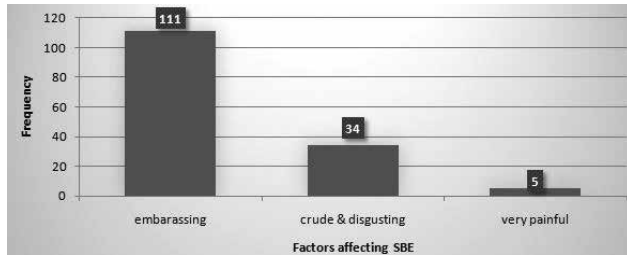
**Fig. 2: Exposure to mammography among study participants (n = 150)**

Only 1.3% of women in our study population have done mammography before and 98.7% have not done mammography before.



**Fig. 3: Exposure to Self-Breast Examination (n = 150)**

73.5% women of our study population have considered SBE as embarrassing, 76.7% were not aware that SBE helps in early detection of breast cancer. 100% women in our study population were interested in knowing more about SBE. 100% women in our study population considered SBE necessary.



**Fig 4: Factors affecting Self Breast Examination (n = 150)**

Among 4% of women who have performed SBE before, 3.3% of them have done occasionally.4% of women in our study population have performed SBE in the bathroom. In our study population among 150 women, 50% of them have not performed SBE as they did not know how to do it, 28.7% were not aware about SBE,11.7% of them were of the opinion that they can never have breast cancer, 4.3% of them were scared of being diagnosed with cancer.

**ASSOCIATION**

**Table 3: Education and SBE awareness (n = 150)**

Education	Aware SBE	Aware %	No	Total	P value <sup>#</sup>
Illiterate	4	11.4	15	19	0.171
Primary School	2	5.7	18	20	
Secondary	5	14.3	26	31	
Higher Secondary	10	28.6	31	41	
Graduate	14	40	25	39	
Total	35	100	115	150	

<sup>#</sup>Chi-square test was not significant

From Table 3 we can infer that education of the study population has no impact on the awareness of SBE. Even most of those have crossed higher secondary education were not aware that SBE helps in early detection of breast cancer.

**Table 4: Education and mammogram exposure (n = 150)**

Education	Yes	No	Total
Illiterate	0(0%)	19(12.8%)	19
Primary School	0(0%)	20(13.5%)	20
Secondary	1(50%)	30(20.3%)	31
Higher Secondary	0(0%)	41(27.7%)	41
Graduate	1(50%)	38(25.7%)	39

From table 4, Education of the study population has no impact on their awareness on mammography. Right from illiterates to graduates (98%) have not done mammography before.

100% of women in our study population were willing to know more about SBE

**DISCUSSION**

Our study revealed no significant differences between the respondents age up to 63yrs, educational level and their knowledge on SBE. Only about 4% of

women in our study population have heard about SBE in accordance to the study conducted by Jahan S et.al.<sup>3</sup> in Saudi Arabia showed awareness about 30.3%. While a study conducted in Turkey <sup>4</sup> showed the awareness to be 26.2% and 12% Saadon F.etal., in kuwait<sup>5</sup> and in contrast to Tu SP etal., showed to have awareness about 75% <sup>6</sup>

Our study did not show significant relationship between socio demographic variables and practicing SBE, while in contrast to study done by Montazeri A etal.<sup>7</sup>, there was significant difference. Furthermore the study of Malaysian teachers identified that there was no association between sociographic variables and practicing SBE <sup>8</sup>

Only 24% of women in our study population have recognized SBE as a breast cancer prevention method in accordance to Mary Atanga et al.,<sup>9</sup> were only 36.67% recognized it as a prevention method. Only 8.5% of women in our study population have family H/O breast cancer in accordance with the study conducted at turkey (5%)<sup>10</sup>

Assessment of study population's knowledge, attitude and beliefs showed that majority of women reported that the right time to practice SBE was I don't know before intervention and one week after menses after intervention. Some of the respondents reported that they would not practice SBE because they did not know how to do it and some have not practiced because they were afraid of detecting any evidence of breast cancer.

### CONCLUSION

Overall awareness regarding SBE is very low. Although results indicate that the practice of SBE while perceived as being important is not frequently practiced in these women in Trichy. Even those who knew about SBE were not aware of the correct steps of SBE. Since there is a need for a regular vigorous education program. It is recommended to organize frequent breast self-examination education programs and encouraging women to practice SBE. It is hoped that this will help to reduce morbidity and mortality associated with breast cancer.

**Ethical Clearance:** obtained from Institutional Ethical Committee.

**Conflict of Interest:** None declared

**Source of Funding:** Self

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# Study on Profile of Pregnancy Outcomes in a Tertiary Care Hospital in Trichy, South India

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## ABSTRACT

**Introduction:** Globally, an estimate of 210 million women become pregnant each year; out of them 15 to 20% results in miscarriage. Antepartum hemorrhage, abruption, hypertensive disorders including eclampsia, premature rupture of membrane, gestational diabetes, and many more complications have been known to precipitate adverse pregnancy outcomes. Decentralized maternal and child health services have greatly expanded coverage; however, hospitals remain the cornerstone of pregnancy related care. High level obstetric services, such as cesarean delivery and blood transfusion must be available in emergency referral situations to reduce the adverse outcomes. Hence, a retrospective record based study was done to determine various outcomes of pregnancy.

**Methodology:** A record based study on profile of pregnant women who had delivered in Tertiary Care Hospital for a period of 1 year from Jan 2017 – Dec 2017. Data entered and analysed using SPSS V.15.0 and presented in a form of tables.

**Results:** Among 916 pregnant women, 72.9% were Hindus, 14.5% of people were Christians and 12.6% were Muslims. About 51.6% were in the age group of 19 – 25 years and 92.6% were free from co-morbidities. Of 916 women studied 46.2% delivered normally.

**Conclusion:** High-level obstetric services will improve the pregnancy outcomes. Adverse outcomes can be reduced by preventing the mothers from developing risk factors through effective antenatal and intrapartum care.

**Keywords:** *Pregnancy Outcomes, Tertiary Care, Tamil Nadu, Co-morbidities, Complications*

## INTRODUCTION

Globally, an estimate of 210 million women become pregnant each year<sup>1</sup>. Out of them 15 to 20% results in miscarriage<sup>2</sup>. About 2.65 million result in stillbirths, while 98% of these Stillbirths occur in developing countries<sup>3-7</sup>. South Asia has the highest Still birth rates (25 to 40/1000 births) in the world; moreover India alone contributes to the huge burden of these outcomes, i.e., an estimate of 39% of all global SBs<sup>6</sup>, 40% of Asian low birth weight (LBW) babies<sup>8</sup>, and 4.86% miscarriages<sup>9</sup> occur annually in India. Compared to other states in

India, the health risk faced by pregnant women and newborns in Tamil Nadu are low.

Antepartum hemorrhage, abruption, hypertensive disorders including eclampsia, premature rupture of membrane, gestational diabetes, and many more complications have been known to precipitate adverse pregnancy outcomes<sup>1-3,5,7,9</sup>. Decentralized maternal and child health services have greatly expanded coverage; however, hospitals remain the cornerstone of pregnancy related care. High-level obstetric services, such as cesarean delivery and blood transfusion must be available in emergency referral situations to reduce the adverse outcome. In this context, this study was carried out in Tertiary Care Hospital to study the Pregnancy Outcomes for a period of 1 year.

## MATERIALS AND METHOD

A Record based study regarding pregnancy outcomes and its risk factors was conducted in Tertiary Medical

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College in Trichy, Tamil Nadu. The study was conducted during January 2018 to March 2018 (2 months). The study included all case records of pregnant women who got admitted in the institution for safe confinement during the period between 1<sup>st</sup> January 2017 to 31<sup>st</sup> December 2017. The proforma was designed to collect the data regarding Socio-demographic details, past obstetric history, indications for caesarean section, presence of co-morbidities, course & outcome of the present pregnancy. Data was collected, entered and analysed using SPSS v.15.0. Records were scrutinized after obtaining permission from appropriate authorities. Ethical clearance was obtained from Institutional Ethical committee.

## RESULTS

The study consisted of details of 916 pregnant women were admitted for safe confinement. In the Study population, Majority (72.9%) was consisted by Hindus, followed by Christians (14.3%) and Muslims (12.6%). Almost 88.4% of the Study population belonged to the age group of 20 – 29 years, While 11.1% of them were aged above 30 years and less than 0.4% were aged less than 20 years. Table One, shows about distribution of study population based on Age and Parity. In the study population nearly half (45.6%) of them were para one, 39.1% belonged to para 2, while only 15.3% belonged to Para 3 & above.

**Table 1: Distribution of Study Population Parity and Co - morbidities (N = 916)**

Parity Category	Co-Morbidities							Total
	Diabetes	Hypertension	Eclampsia	Anemia	Thyroid	Heart Disease	Nil	
Para 1	4	6	5	2	18	1	382	418
Para 2	10	6	2	6	14	0	320	358
Para 3	1	3	1	3	8	0	124	140
Total (%)	15 (1.6)	15 (1.6)	8 (0.9)	11 (1.2)	40 (4.4)	1 (0.1)	826 (90.2)	916

Table 1 shows about distribution of study population based on parity and co-morbidities. About 9.8% of the population had co-morbidities. Most common Co-morbidity were Thyroid diseases (4.4%), followed by Diabetes (1.6), Hypertension (1.6), Anemia (1.2%), Eclampsia (0.9%) and Heart diseases (0.1%).

**Table 2: Distribution of Birth weights based on Mode of Delivery (n = 916)**

Delivery Type	Birthweight in Kgs					Total (%)
	< 1	1 - 1.4	1.5 - 2.4	2.5 - 3.4	> 3.5	
Normal	1	2	101	307	12	423 (46.2)
Forceps	0	0	6	35	3	44 (4.8)
Elective Caesarean	0	1	22	84	7	114 (12.4)
Emergency Caesarean	1	1	63	221	24	310 (33.8)
Vaccum	0	0	2	18	1	21 (2.3)
VBAC	0	0	2	2	0	4 (0.4)
Total (%)	2 (0.2)	4 (0.4)	196 (21.4)	667 (72.8)	47 (5.1)	916 (100)

Table 2 shows the distribution of study population based on mode of delivery and birth weight of the child. Nearly half of them (46.2%) of the study population had Normal delivery, followed by Emergency Caesarean (33.8%), Elective Caesarean (12.4%) and so on. Majority 72.8% of birthweight of children born with normal weight, while 22% belonged to underweight and around 5.1% children had birthweight more than 3.5 kg.

**Table 3: Distribution based on Parity and Birth Weight**

Parity Category	Birthweight in Kgs					Total (%)
	< 1	1 - 1.4	1.5 - 2.4	2.5 - 3.4	> 3.5	
Para 1	0	2 (0.5)	103 (24.7)	292 (69.8)	21 (5.0)	418 (45.7)
Para 2	2 (0.6)	2 (0.6)	58 (16.2)	274 (76.5)	22 (6.1)	358 (39.1)
Para 3 & above	0	0	35 (25.2)	101 (71.9)	4 (2.9)	140 (15.2)
Total (%)	2 (0.2)	4 (0.4)	196 (21.4)	667 (72.8)	47 (5.1)	916 (100)

Table 3: shows the distribution of child birthweights based on parity of the mother. 1.2% of mothers of second Parity had given birth to very Low birth weight babies (0.6%) and extremely low birthweight babies (0.6%), while higher weight category of more than 3.5 kg (6.1%) birthweight were also seen in the second group.

**Table 4: Distribution of study subjects based on parity and pregnancy outcomes**

Parity Category	No. of Previous Abortions			Total	No. of Previous Still Births		Total	Grand Total
	1	2	3		1	2		
Para 1	41	10	0	51	1	0	1	418
Para 2	63	21	4	88	1	0	1	358
Para 3 & above	44	5	2	51	14	1	15	140
Total (%)	148 (77.9)	36 (18.9)	6 (3.2)	190 (100)	16 (94.1)	1 (5.9)	17 (100)	916

Table 4 shows distribution of study subjects based on previous history of Abortion and Still Births. Nearly one-fifth (20.7%) of the study population had previous history of Abortions, while 1.9% of them had experienced Stillbirths in previous pregnancies. Among those who had abortions, 3.2% had experienced more than three abortions, while among those who experienced stillbirths, 5.9% of them had two stillbirths.

**Table 5: Distribution based on Parity, Age and previous Delivery Type (n = 502)**

Parity/Age Category	History of previous Delivery type			Total (%)
	Normal	Elective Caesarean	Emergency Caesarean	
Para 1	8	0	0	8 (1.6)
Para 2	193	97	65	355 (70.7)
Para 3 & Above	93	25	21	139 (27.7)
Total (%)	294 (58.6)	122 (24.3)	86 (17.1)	502 (100)
≤19	2 (100)	0	0	2 (0.4)
20 – 24	109 (60.6)	34 (18.9)	37 (20.6)	180 (35.9)
25 – 29	138 (58.2)	67 (28.3)	32 (13.5)	237 (47.2)
30 – 34	42 (57.5)	16 (21.9)	15 (20.5)	73 (14.5)
≥35	3 (30)	5 (50)	2 (20)	10 (2.0)
Total (%)	294	122	86	502 (100)

Table 5 shows, the distribution of type of previous delivery based on parity and age groups. Among 916 study population only 512 (55.9%) had underwent previous delivery. In this study nearly one-fourth (24.3%) of the study-population underwent previous Elective caesarean section, while 17.1% underwent Emergency Caesarean Section. While, almost equal percentage distribution of Normal (60%), Elective (25%) and Emergency Caesarean Section (20%) is seen among different age groups.

**Table 6: Month-wise distribution pattern of Mode of Delivery (n = 916)**

MONTHS (2017)	Mode of Delivery						Total (%)
	Normal (%)	Forceps (%)	Elective Caesarean (%)	Emergency Caesarean (%)	Vacuum (%)	VBAC (%)	
JAN	19 (4.5)	1 (2.3)	6 (5.3)	17 (5.5)	1 (4.8)	1 (25.0)	45 (4.9)
FEB	21 (5.0)	2 (4.5)	4 (3.5)	10 (3.2)	1 (4.8)	0	38 (4.1)
MAR	45 (10.6)	3 (6.8)	12 (10.5)	9 (2.9)	0	0	69 (7.5)
APR	29 (6.9)	2 (4.5)	5 (4.4)	27 (8.7)	0	0	63 (6.9)
MAY	33 (7.8)	3 (6.8)	7 (6.1)	18 (5.8)	0	0	61 (6.7)
JUN	38 (9.0)	4 (9.1)	5 (4.4)	19 (6.1)	5 (23.8)	0	71 (7.8)
JULY	46 (10.9)	5 (11.4)	6 (5.3)	48 (15.5)	5 (23.8)	0	110 (12.0)
AUG	40 (9.5)	6 (13.6)	15 (13.2)	26 (8.4)	2 (9.5)	2 (50.0)	91 (9.9)
SEPT	28 (6.6)	4 (9.1)	11 (9.6)	30 (9.7)	1 (4.8)	1 (25.0)	75 (8.2)
OCT	42 (9.9)	5 (11.4)	15 (13.2)	34 (11.0)	2 (9.5)	0	98 (10.7)
NOV	47 (11.1)	4 (9.1)	23 (20.2)	33 (10.6)	4 (19.0)	0	111 (12.1)
DEC	35 (8.3)	5 (11.4)	5 (4.4)	39 (12.6)	0	0	84 (9.2)
Total (%)	423 (46.2)	44 (4.8)	114 (12.4)	310 (33.8)	21 (2.3)	4 (0.4)	916 (100)

Table 6, shows monthly distribution patterns of mode of delivery from January to December 2017. Normal and emergency caesarean section were the most common mode of delivery during the period. The number of deliveries peaked during the months of July, October and November. This pattern is noticed all modes of deliveries.

Most common reasons for Cesarean section were Previous LSCS 161 (77.4%), followed by Meconium stained liquor 60 (28.8%), Oligohydramnios 45 (21.6%), fetal distress 40 (19.2%), Cephalo-pelvic disproportion 40 (19.2%), Delayed labour 23 (11.1%), Scar Tenderness 22 (10.6%), Breech Presentation 15 (7.2%), Abnormal Presentation 7 (3.4%), Medical co-morbidities 6 (2.9%) and least common were IUGR 5 (2.4%).

## DISCUSSION

The study consisted of details of 916 pregnant women were admitted for safe confinement. In the Study population, Majority (72.9%) was consisted by Hindus & nearly half (45.6%) of them were para one. Almost 88.4% of the Study population belonged to the age group of 20 – 29 years, while only 26.14% of similar age-group was reported in a study from Karnataka<sup>10</sup>. About 9.8% of the population had co-morbidities, most common Co-morbidity were Thyroid diseases (4.4%), followed by Diabetes (1.6), Hypertension (1.6), Anemia (1.2%), Eclampsia (0.9%) and Heart diseases (0.1%),

which is higher than that was reported in the study from Karnataka<sup>10</sup>. Nearly half of them (46.2%) of the study population had Normal delivery, followed by Emergency Caesarean (33.8%) & Elective Caesarean (12.4%). Around 22% birth weight of children born were underweight (i.e < 2.5 Kg) and around 5.1% children had birthweight more than 3.5 kg. Nearly one-fifth (20.7%) of the study population had previous history of Abortions, while 1.9% of them had experienced Stillbirths in previous pregnancies. In this study nearly one-fourth (24.3%) of the study-population underwent previous Elective caesarean section, while 17.1% underwent Emergency Caesarean Section, these findings corroborates with the study of Chaudhari DR<sup>11</sup> in Kolapur. Normal and emergency caesarean section were the most common mode of delivery during the period, which is lower than that was reported in the study of Damaru P Paneru from Karnataka<sup>10</sup>. The number of deliveries peaked during the months of July and December. This pattern is noticed all modes of deliveries.

## CONCLUSION

In the study, less than half (46.2%) of the pregnancy outcomes were Normal Vaginal Delivery, which is low. Prevalence of low birth weight was also higher (22%). Prevalence of Co-morbidities was also higher in this study. Provision of High-level obstetric services at right time will improve the pregnancy outcomes. Adverse outcomes can be reduced by preventing the mothers



from developing risk factors through effective antenatal and intrapartum care and Health education.

### LIMITATIONS

Despite the well-established recording system in the study hospital, a limitation of the retrospective design is also persisting in this study. A prospective study can help us to determine many factors that affect pregnancy outcome which were not mentioned in the records.

**Ethical Approval:** obtained from Institutional Ethical Committee.

**Conflict of Interest:** None declared.

**Source of Funding:** Self

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# A Study of Knowledge, Attitude and Practice Regarding E-waste Management among Nursing Students at a Tertiary Care Hospital

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## ABSTRACT

**Background:** Our world is marching towards a major crisis regarding solid waste management and public health recognized as E-waste or WEEE (Waste Electrical and Electronic Equipments).

**Aim:** is to assess the general awareness of nursing students regarding E-waste management.

**Method:** This cross sectional study was conducted amongst nursing students of GNM course at KINS, Karad, Maharashtra. After obtaining institutional ethical clearance; a predesigned pretested questionnaire was administered to nursing students with their informed consent. Sample size calculated was 86, but all students from all academic years of GNM course from KINS were included in this study (150). Percentages, Proportions were calculated from collected data. Chi-square Test was applied to get Chi-square value and p-value. SPSS – 20 and GraphPad InStat software used for statistical work.

**Results:** Among the 150 study subjects 139 (92.7 %) subjects have heard the term E- waste. They were aware of toxic nature of E-waste (58.0%), impact of improper disposal of E-waste (84.7%) and its environmental and health hazards (73.3%). They knew that there were rules and regulations about E-waste disposal (69.3%).

**Conclusions:** Creating awareness is not enough but concurrent change in the attitude of people will play measure role in handling of E-waste.

**Keywords:** E-waste, Management, Awareness, KAP, WEEE

## INTRODUCTION

The “E-waste” or the “Electronic waste” includes the used electronics which are intended for resale, recycling, reuse, and salvage or disposal e.g. discarded computers, television sets, mobile phones and radios, refrigerators, office electronic equipment.<sup>1</sup>India ranks 5<sup>th</sup> position in generation of E-waste, with USA (1<sup>st</sup>), China (2<sup>nd</sup>), Japan and Germany.<sup>2,3</sup> In 2016, 44.7 million tons of E-waste was generated globally at compound growth

rate of 20%. Out of this only 20% (8.9 million tons) was properly collected, recycled and documented. India generates about 2 million tons of E-waste per annum. Out of which only 5% is recycled and rest 95% is managed by unorganized sector and scrap dealers. Currently India is generating E-waste at a rate; that is 4.56 times greater than its annual processing capacity. By the end of 2018 India is likely to produce 3 million tonnes of E-waste annually.<sup>2</sup>Currently E-waste is disposed by recycling, landfilling, incineration, and reuse.<sup>4</sup>

This E-waste contains hazardous metals viz. lead, cadmium, beryllium etc. (60%), plastic (30%) and hazardous pollutants (2.70%).It is also a contains valuable metals like copper, silver, gold.<sup>5</sup>In correct processing or dismantling of E-waste can spread these hazardous materials into dust, soil, river sediment, surface water, and ground water etc. Exposure to them can cause respiratory disorders, skin disorders,

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bronchitis, lung cancer, heart, liver, and spleen damage<sup>2</sup>. It also affects environment e.g. land filling of E-wastes forms contaminated leachates pollute ground water e.g. cadmium from one mobile can pollute 600 m<sup>3</sup> of water. Incineration of E-waste can emit toxic fumes and gases and pollutes air.<sup>4</sup>In India E-waste Rules were notified in 2011 and came into force from May 2012.<sup>6</sup> Recently they were amended for effective management of E-Waste in the country.<sup>7</sup> Extended Producer Responsibility is the base of framework and the rules state that the Producers of electronic and electrical equipments (EEE) set up a system to collect and manage the end-of-life equipments. Punishments for improper disposal, and the law for these punishments is introduced by Central Pollution Control Board or CPCB.<sup>1</sup>

E-waste has become a global crisis because of its rapid generation rate and its contents that are dangerous to both human health and environment<sup>1</sup>. Lack of awareness, appropriate skill for disposal, a legal framework, a collection system, are worsening the problem<sup>4</sup>. In view of this we are conducting this study with the following aims and objectives.

**AIM AND OBJECTIVES**

**Aim:** To study knowledge, attitude, and practices regarding E-waste amongst nursing students of Krishna Institute of Nursing Sciences.

**Objectives:**

1. To study the knowledge status of E-waste and its environmental and health hazards.
2. To study the awareness regarding the existence and current disposal practices of E-waste.
3. To study the knowledge related to E-waste rules and proper disposal methods.

**MATERIALS AND METHOD**

**Study Design:** A cross sectional study.

**Study Subjects:** Nursing students at Krishna Institute of Nursing Sciences (KINS), Karad, Maharashtra.

**Mode of Selection of Subject:** All students from all academic years of GNM course from KINS were included in this study.

**Study Tool:** A pretested Questionnaire. It contained questions related to knowledge of E-waste and its environmental and health hazards, E-waste rules and proper disposal methods.

**Sample size:** According to a study conducted by Cynthia et al<sup>5</sup>, the knowledge of E-waste management amongst girls was 30.95% and in boys 38.88 %. Considering allowable error of 10%, sample size calculated using the formula  $n = 4pq/L^2$  was 86. But all 150 students from all three academic years were included in the study.

Institutional ethical committee clearance was obtained before commencing the study. Informed consent was obtained before the questionnaire was administered to nursing students.

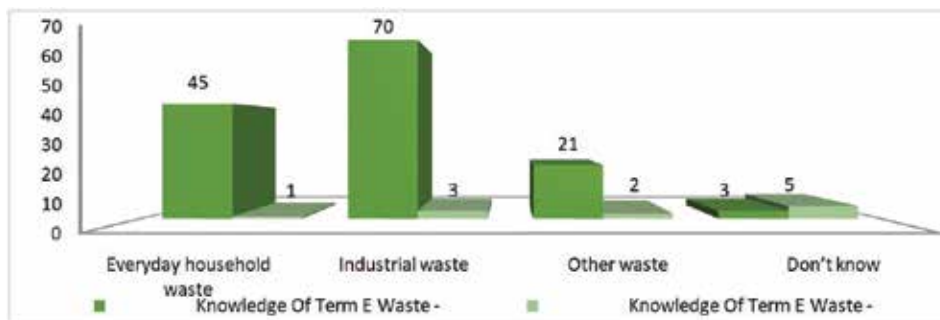
**Statistical Methods for Analysis:** Percentages, Proportions were calculated from collected data. Chi-square Test was applied to get Chi-square value and p-value. SPSS – 20 and GraphPad InStat software used for statistical work.

**OBSERVATION AND RESULTS**

**Table 1: Age wise distribution of subjects who heard the term E-waste**

Subjects who heard the Term E-waste	Age		Total
	Below 20 years	Above 20 years	
Yes	106 (92.2%)	33 (94.3%)	139 (92.7%)
No	9 (7.8%)	2 (5.7%)	11 (7.3%)
<b>Total</b>	<b>115 (76.7%)</b>	<b>35 (23.3%)</b>	<b>150 (100.0%)</b>

Among the 150 study subjects 11 (7.3 %) were male and 139 (92.7 %) were females. Among them 58 (38.7 %) were from first year, 43 (28.6 %) were from second year, and 49 (32.7 %) were from third year of GNM course. 115 (76.7 %) were below 20 years of age and remaining 35 (23.3 %) were above 20 years.



**Figure 1: Exact knowledge of E-waste**

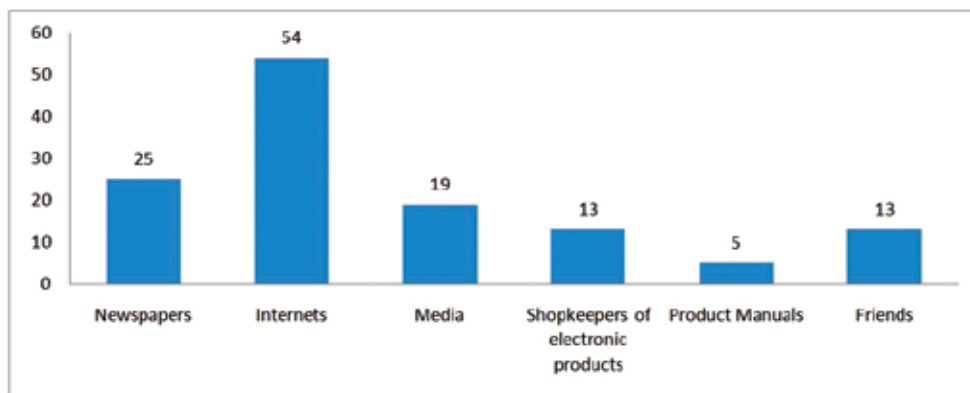
139 (92.7%) subjects said they heard term E-waste. 70 (50.3%) subjects consider industrial waste as E-waste, 45 (32.4%) subjects as everyday household waste, 21 (15.1%) subjects thought E-waste is other kind of waste than the above two types. Rest 2.2% subjects admitted they didn't know the answer. 92.7 % (139) subjects know the term E-waste but they don't have an exact and clear idea of E-waste.

**Table 2: Distribution of subjects according to their Knowledge about term E-waste**

Criteria	Responses	Knowledge about term E-waste		Total	Chi-Square Value	P-value
		Yes	No			
Nature of E-waste	Correct Answer (Toxic)	81(58.3%)	6 (54.5%)	87(58.0%)	0.05815	0.8094
	Wrong Answer	58(41.7%)	5 (45.5%)	63(42.0%)		
E-waste disposal practices	Correct Practices	77(55.4%)	3 (27.3%)	80(53.3%)	2.208	0.1373
	Wrong Practices	62(44.60%)	8(72.72%)	70(46.7%)		

87(58.0%) subjects knew toxic nature of E-waste. Among the 63 subjects who said it is non toxic, 58 subjects knew term E-waste but did not know exact nature of E-waste. Such major group who don't perceive toxic nature of E-waste may/will contribute to production as well as improper disposal of E-waste.

77 subjects who have heard the term E-waste are inclined towards the correct methods of E-waste disposal (Second hand market, Return/ exchange at the brand store, licensed recycler), while 62 subjects, even though they knew term E-waste are disposing their unused EEEs in wrong way (Kabaadiwalas, Giving to Friends /Relatives/ Maids, Just throw it away with regular waste, Stockpile in house or garage).



**Figure 2: Source of information regarding E-waste**

Internet 54 (36 %), followed by newspaper (16.7 %) and Media (12.7%) were major sources of information on E-waste for these study subjects.

**Table 3: Distribution of subjects according to their awareness about the impact of improper disposal of the EEE**

Criteria	Responses	Awareness about the impact of improper disposal of the EEE		Total	Chi-Square Value	P-value
		Yes	No			
Effects of improper disposal of the electrical and electronic equipments	Have correct Knowledge of effects of improper disposal of EEE	93 (73.2 %)	17 (73.9%)	110 (73.3%)	0.004668	0.9455
	Don't have correct knowledge of effects of improper disposal of EEE	34 (26.8 %)	6 (26.1%)	40 (26.7%)		

Conted...

<b>Responsibility of proper E-waste management</b>	<b>Correct Answer</b>	67 (52.8%)	11 (47.8%)	78 (52.0%)	<b>0.04353</b>	<b>0.8347</b>
	<b>Wrong Answer</b>	60 (47.2%)	12 (52.2%)	72 (48.0%)		

110 subjects (73.3%) were aware of effects of improper disposal of EEE. Out of these 93 said improper disposal of EEE has impact on both health and environment. 34 subjects did not agree with them although they are aware of impact of improper disposal of EEE. Majority subjects knew that it is not right to dispose EEE in improper way but didn't know the exact reason.

Here 78 (52.0%) subjects were convinced that responsibility of proper E-waste management should be equally shared by all i.e. Government Agencies, Producers, and Consumers which is a correct response. While other 72 (48.0%) subjects put this responsibility on any one of the above mentioned agencies.

**Table 4: Distribution of subjects according to their thoughts on buying second hand products**

Criteria	Responses	Thoughts on buying second hand products		Total	Chi-Square Value	P-value
		Yes	No			
<b>Reasons for buying new equipments</b>	<b>Permanent damage/loss of function</b>	23 (36.5%)	27 (31.0%)	50 (33.3%)	<b>0.2771</b>	<b>0.5986</b>
	<b>Lifestyle demand</b>	40 (63.5%)	60 (69.0%)	100 (66.7%)		
<b>Attitude towards unused EEE</b>	<b>Yes, It Is Waste</b>	14 (22.2%)	12 (13.8%)	26 (17.3%)	<b>1.271</b>	<b>0.2595</b>
	<b>No, Can be Repaired and/or Reused/Can Utilize Components/ Raw Materials</b>	49 (77.8%)	75 (86.2%)	124 (82.7%)		

Permanent damage or loss of function were the ultimate reasons to buy new gadget for 50(33.3%). But lifestyle demands like desire for newest technology and greater functionality (66.7%) precedes over them. This explains the reasons behind excessive and rapid production of EEE and generation of E-waste.

The attitude of 124 subjects (82.7%) towards unused EEEs was to repair or reuse or utilize the components or raw materials but 75 subjects amongst them didn't want to buy second hand products. This attitude of not buying old equipments for advances in technology would help to increase in E-waste production.

**DISCUSSION**

92.7% subjects in present study have heard the term E-waste and 58.3% of them regard E-waste as toxic. Even though more people have heard the term E-waste in present study it seems they haven't gained more

information beside the term itself, which is similar to the study by toxic links<sup>6</sup>. In a study conducted in importers (82%), scavengers (94%) and householders (78%) were not aware about hazardous nature of e-waste<sup>8</sup>, because this study was done in 2013 in a underdeveloped country like Nigeria. Also other factors like economic status, educational status, age, customs and belief, scarcity of information services may be responsible for it.

In present study return or exchange at brand store was major practice of disposing unused EEE (24.0%). While in toxic links<sup>6</sup> study it was (15.285%). In Toxic links<sup>6</sup> kabaadiwala (46.08%) was preferred for disposal. Options like exchanging, changing markets and online stores may have helped here. Second hand market is another lurking option in present study (11.3%) and in toxic links<sup>6</sup> study it was (21.045%). Second hand market was easily available method to people, but decreased percentage might be due to less returns from second hand market compared to returning or exchanging the unused

EEEs. In present study 17.3% voted for licensed recycler compared to toxic links<sup>6</sup>(0.753%). However in study by Anuj Shah<sup>9</sup> people preferred to sell or give their unused EEE to their personal contacts (35%) or to keep them in home (26%). In present study both of these percentages were 8.0 % and 8.7% respectively. People have adopted these practices because either they didn't know proper methods of disposal or they were not available to them.

84.67% subjects of present study were aware of impact of improper disposal of unused EEE. 73.2% of them knew E-waste has both environmental and health hazards. While 65% respondents in Anuj Shah's<sup>9</sup> study either didn't perceive any health or environmental hazards to E-waste or didn't know of specific hazards. Present study showed more awareness of people regarding impact of improper disposal of E-waste.

In present study 69.3% subjects were aware of existence of E-waste disposal rules. While in a study by Anuj Shah<sup>9</sup>(89%) and Toxic Links<sup>6</sup>(66%) study participants were not aware of E-waste rules. 52% of the study subjects in this study considered responsibility of E-waste management is on government agencies, producers, and consumers altogether, as compared to 21.99% from study by toxic links<sup>6</sup>. The present study shows increase in awareness of people regarding existence of rules and regulations E-waste disposal accompanied with change in attitude of people towards accepting responsibility of proper disposal.

Desire for newest technology was the leading reason for purchasing new EEE by subjects in present study (38%) similar to studies by Anuj Shah<sup>9</sup> (61% i.e. mobiles and computers) and Cynthia et al<sup>5</sup>(45.83% i.e. new gadgets). Current lifestyle trend of being updated and rapid changes in technology are the driving forces to make people buy gadgets with newest technology. 82.7% subjects of present study think unused EEE are not waste instead they can be repaired, reused or can utilize its components as raw materials. This percentage is more than Anuj Shah's<sup>9</sup> study i.e. 61%.

## CONCLUSION

It seems subjects only knew the term E-waste. They don't understand how E-waste is produced around them which contribute to more generation of E-waste and its improper disposal. Raising awareness might

help to control E-waste generation at its origin and its segregation from regular waste. They knew the rules and regulations but not in detail, which makes them to deny their share of responsibility in proper disposal of their unused EEE's. Rapid change in the technology, design, functionality, lifestyle changes, and attitude of subjects towards second hand EEE's are also contributing for E-waste generation. Subjects are more inclined towards method of disposing which is easy, within their reach and beneficial to them.

## RECOMMENDATIONS

We can increase their knowledge, awareness and change their attitude through internet and mobiles in their hand. Online stores can help to collect unused EEE's through exchange offers. Adding more topics and hands on activities regarding E-waste in their curriculum will also help. Being nursing student, they are going to be in contact with community around them and they can be useful tool to tackle E-waste at rural level if they are made to interact more with various aspects of E-waste.

**Source of Funding:** No funding sources

**Conflict of Interest:** None declared

**Ethical Clearance:** This study was approved by institutional Ethics Committee

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# Hostile Tobacco and Oral Health—A Review

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## ABSTRACT

Tobacco is being used in various forms. Smoking type includes bidis, cigarettes, cigars and others. Smokeless tobacco products are Betel quid, mawa, dry snuff and many more. By 2020, it is predicted that tobacco will account for 13% of all deaths in India. Oral cavity is the first to encounter tobacco and the major tobacco related oral lesions are tooth stains, abrasions, Acute Necrotizing Ulcerative Gingivitis (ANUG), Periodontitis, dental implant failure, smoker's melanosis, nicotinic stomatitis, palatal erosions, pre-malignant lesions and oral carcinoma. Active role of dental professionals in tobacco control initiatives and cessation programmes is important due to their direct contact with patients who are at increased risk. This article emphasizes in detail on the various effects of tobacco on oral health.

**Keywords:** Tobacco, Oral lesions, Dental Professionals.

## INTRODUCTION

Plants of the genus 'Nicotiana' are used for the production of tobacco. Tobacco use dates back since the dawn of human civilization. Tobacco has been used in smoke form and smokeless form<sup>1</sup>. Smoking type includes bidis, cigarettes, cigars, pipes, chillum, kreteks, hookah, water pipes and other locally used forms. Smokeless tobacco products are Betel quid, mawa, dry snuff, gutka, khaini, and many more<sup>2,3</sup>. WHO states that there are 1100 million regular smokers in the world today. Globally one in ten adults die because of tobacco related causes and 15 million deaths occur each year. India is the world's third largest tobacco growing country and the second largest consumer of tobacco products<sup>4</sup>. By 2020, it is predicted that tobacco will account for 13% of all deaths in India. Smoking or chewing tobacco has significant detrimental

effects on general and oral health. Tobacco use is a potential risk factor for chronic conditions like cancer, cardiovascular and pulmonary diseases. Oral cavity is the first to encounter the ill effects of tobacco smoking or chewing. More than one type of lesion can occur in any individual patient and the site and appearance of such tobacco associated lesions are influenced by the forms of tobacco usage. The major tobacco related oral lesions can be described under dental, gingival and mucosal conditions which include tooth stains, abrasions, Acute Necrotizing Ulcerative Gingivitis (ANUG), Periodontitis, dental implant failure, smoker's melanosis, nicotinic stomatitis, palatal erosions, pre-malignant lesions and oral carcinoma. Deleterious effects of tobacco are due to changes in cell morphology, cellular atypia, increased nuclear cytoplasmic ratio and widening of intercellular spaces, increased oxidative stress, neuronal apoptosis, and DNA damage.

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## EFFECTS OF TOBACCO ON ORAL HEALTH

**Halitosis, Taste and Smell:** Smoking is likely to cause halitosis and may affect smell and taste. Alteration of taste and smell is associated with coated tongue caused due to tobacco habits.<sup>6</sup>



Among extrinsic causes of halitosis, smoking is often quoted as an etiological factor. This is generally referred to as smoker's breath<sup>4, 6</sup>. Cigarette smoke contains Volatile Sulphur Compounds (VSCs) which can be detected using a halimeter, although the concentration of detectable VSCs in the breath is strongly influenced by the time since the last cigarette was smoked. Volatile sulphur compounds also arise due to bacterial metabolism of amino acids.<sup>6</sup>

**Discoloration:** Smoking has been reported to cause brown/black discoloration of teeth, dental restorations and dentures, caused by tar and other by-products of combustion. Although deposits are primarily of esthetic concern, they may also promote plaque accumulation<sup>7</sup>.

**Abrasion:** Pipe smoking and the use of smokeless tobacco are commonly associated with tooth abrasion. Abrasion from pipe smoking occurs on the occlusal surfaces in association with placement of the pipe stem, whereas abrasion from smokeless tobacco usually occurs on the vestibular surface opposite the wad of smokeless tobacco, but may involve the occlusal surfaces if the tobacco is chewed<sup>2</sup>. Abrasion may result in dentin hypersensitivity, pulp exposure or apertognathia. Apertognathia develops in pipe smokers and usually occurs unilaterally on the smoker's favorite side.<sup>8</sup>

**Dental caries:** Smoking has been correlated with increased caries incidence.<sup>9</sup> Cigarette smoke impairs salivary function, where saliva has an important protective role against dental caries. Other authors have indicated that smokers and non-smokers may have different salivary buffering capacity, which may also affect susceptibility to caries.<sup>10</sup> Tobacco in fact might increase dental decay as it lowers salivary pH and the buffering power.<sup>9</sup> In vitro evidence suggests nicotine may increase biofilm formation<sup>11</sup>.

Caries risk may be greater with smokeless tobacco, possibly related to the prolonged exposure to sugars. Increased susceptibility to root caries is presumed to result from the gingival recession and the high sugar content of smokeless tobacco. Sugar content been reported to be 34% on average in different preparations of chewing tobacco.<sup>12</sup>

**Effects on periodontium:** Although gingivitis and periodontitis are caused by bacteria, smoking has been strongly implicated as a risk factor for the initiation and propagation of periodontal diseases.<sup>13</sup> Smoking

has been associated with increased calculus deposition, which can accelerate plaque accumulation, recession and deepening of periodontal pockets.<sup>14</sup> Smokers were recorded to have a 2.5 to 3.5 times greater risk of severe periodontal attachment loss.

The pathogenic subgingival biofilm has both direct and indirect effects on the periodontal tissues. Tobacco smoking affects the humoral mediated and the cell mediated immunity of the host and this may increase susceptibility to periodontal disease.<sup>15</sup>

Periodontal disease severity and quantity of calculus accumulation is directly correlated with the frequency of smoking. Smoking is also associated with an increased risk of periodontal attachment loss and formation of periodontal pockets, as well as alveolar bone loss<sup>13</sup>.

There is evidence for impact of smoking on bone metabolism as there is increased secretion of the bone resorbing factors PGE and IL-1 $\beta$  or a decreased intestinal uptake of calcium, and these factors increases the susceptibility to periodontal disease in smokers. Tobacco smoking disrupts the physiological turnover of tooth-supporting structures with the net effect being periodontal tissue breakdown.<sup>15</sup> Smokers respond less favorably than non-smokers to nonsurgical and surgical periodontal therapy.

**Acute necrotizing ulcerative gingivitis (ANUG):** Smokers tend to have higher prevalence of ANUG than non-smokers. Recently, a similar relationship has been reported between smoking and ANUG-like lesions in HIV infected individuals. ANUG primarily affects young adults who smoke heavily and have poor oral hygiene. Although the exact interaction between ANUG and smoking is not clear, local and systemic effects have been suggested.<sup>14</sup> Plaque accumulation in sites with tar deposits and tissue ischemia secondary to nicotinic vasoconstriction enhances progression of ANUG<sup>16</sup>. The main vasoconstrictive property of nicotine exerts its effect at the end-arterial vasculature of the gingiva and hence gingival bleeding in smokers is 'less severe' than in non-smokers. Tobacco smoking may exert a masking effect on gingival symptoms of inflammation, which might give smoking patients a false sense of gingival health assurance. However smoking up regulates the expression of pro-inflammatory cytokines, such as interleukin-1, which contributes to increased tissue damage and alveolar bone resorption<sup>16</sup>.

**Wound healing:** Tobacco negatively influences wound healing in the mouth. Healing after periodontal scaling, curettage, periodontal surgery or tooth extraction is affected in tobacco users. The mechanism of impaired healing is associated likely with increased plasma levels of adrenaline and noradrenaline after smoking, leading to peripheral vasoconstriction. Impaired PMN function has also been observed in smokers compared to nonsmokers<sup>17</sup>.

**Dental implant failure:** Smoking is correlated with a greater peri-implant disease incidence, including peri-implant mucositis and peri-implantitis. Tobacco use directly compromises the osseointegration of root-form dental implants.<sup>17</sup> Peri-implantitis is the formation of deep mucosal pockets around dental implants, inflammation of the peri-implant tissues, and increased resorption of implant-surrounding bone. Chronic peri-implantitis results in implant failure when left untreated.<sup>18</sup>

Tobacco smoking contributes to increased tooth mobility and tooth loss occurs 1.53 times more frequently in smokers than in non-smokers. The evaluation of the current literature indicates that implant failure, postoperative infections and greater marginal bone loss are more common among smokers than non-smokers, although the scientific evidence remains limited.<sup>17</sup> Periodic periodontal therapy may assist in reducing the incidence of peri-implantitis. When surgical intervention is considered to improve peri-implant supportive tissues, smoking or smoking history may compromise healing and the treatment outcome. The best method to reduce the effect of smoking on implant failure and peri-implant disease is to not smoke<sup>18</sup>.

**Smoker's melanosis:** Smoking is associated with a number of surface epithelial changes that affect tissue appearance. Heavy cigarette smokers show a pigmentation prevalence of about 30% thus giving rise to the designation smoker's melanosis which is most prevalent on the attached gingiva. Smoker's melanosis associated with cigarette or pipe smoking can occur on maxillary and mandibular alveolar mucosa or buccal mucosa and commissures, respectively. It is asymptomatic, the change is not premalignant, and the pigmentation is reversible although it usually takes a year or more after cessation of the smoking habit.<sup>19</sup>

**Smokeless tobacco keratosis:** Snuff pouch or smokeless tobacco keratosis is a white keratotic lesion which

has a translucent appearance rather than an opaque whiteness. Buccal or labial mucosal changes associated with smokeless tobacco use occur at the site where the individual holds the tobacco. This lesion is located only in areas of direct contact with snuff or chewed tobacco and is reversible when the patients stop the habit<sup>19</sup>. The keratosis is dependent upon the type of tobacco and how it is used. The surface epithelium exhibits hyperkeratosis and acanthosis.

Continuous smokeless tobacco use might place the individual at greater risk of carcinoma due to the higher concentration of nitrosamines in the processed tobacco. Conversely, mucosal tissue can resolve to normal within weeks after cessation<sup>20</sup>.

**Nicotinic stomatitis:** Nicotinic stomatitis characteristically occurs posterior to the rugae as redness on the palate, which later assumes a grayish-white and nodular appearance due to periductal keratinization of the minor salivary glands. A characteristic finding is the appearance of multiple red dots, which represent the dilated and inflamed duct openings of the minor salivary glands<sup>19</sup>. Thermal and chemical agents acting locally are responsible for the occurrence of this condition. Nicotinic stomatitis is not considered to be a precancerous lesion. Painful palatal erosions due to heavy smoking may occur in addition to nicotinic stomatitis. The erosions are due to the elevated temperature in the oral cavity for a long period. Thickening of the epithelium and white lesions may also occur. Cessation of smoking and a biopsy must be performed to rule out epithelial dysplasia or carcinoma.<sup>20</sup> Painful palatal erosions due to heavy smoking may occur in addition to nicotinic stomatitis. The erosions are due to the elevated temperature in the oral cavity for a long period.

**Leukoplakia:** Leukoplakia is often associated with tobacco use though idiopathic forms of leukoplakia are recognized. Oral mucosal leukoplakia is potentially premalignant with a reported prevalence among heterogeneous studies of 2.60%.<sup>21</sup> Incidences may be 6 to 10 times greater in smokers compared to non-smokers. A smoking dose-response relationship also exists with developing oral leukoplakia, and the lesion may regress upon smoking cessation.

The site of the oral cavity affected by leukoplakia is often said to be associated with the type of tobacco habit practiced; lateral tongue and floor of mouth in cigarette

smokers, palate in pipe smokers and reverse smokers, commissures in bidi smokers, buccal groves in tobacco chewers where they place the quid and lower or upper labial mucosa in snuff dippers<sup>20</sup>.

A large number of oral carcinomas are associated with precursor lesions of leukoplakia; 3 to 6% of leukoplakia undergoes malignant transformation, with this frequency increasing with longer follow-up periods. Leukoplakia in a patient with a tobacco habit should always be biopsied to determine the presence of epithelial dysplasia or a carcinoma.

Patients with mild or moderate dysplasia have a significant, but not absolute, potential for reversibility and can be managed with the elimination of the suspected etiologic factors. Patients with severe dysplasia or carcinoma in situ have a low potential for reversibility and should be managed by complete surgical excision of the lesion(s) using a regular scalpel followed by histologic examination of the excised tissue<sup>21</sup>.

A case-control study, conducted by Shiu et al. in Taiwan, showed that the adjusted ratio for betel nut chewing and smoking on the occurrence of leukoplakia were 17.43 and 3.22, respectively<sup>22</sup>. These findings suggested that smoking cessation may reduce the number of leukoplakia cases by 36%, while elimination of betel nut may prevent 62% cases of leukoplakia and 26% cases of malignant transformation to oral carcinoma.

**Oral Cancer:** Oral cancer is the eighth most common cancer in the world. Incidence rates of oral cancer are high in developing countries, particularly in areas of South Central Asia where oral cancer is among the three most frequent types of cancer<sup>23</sup>.

Cancer of the oral cavity is high among men. Oral cancer is dominated by squamous cell carcinoma (present in 90%-95% of all oral cancers), and the role of tobacco in the development of oral squamous cell carcinoma is well recognised<sup>24</sup>.

Tobacco smoke has a direct carcinogenic effect on the epithelial cells of the oral mucous membranes and there is a dose-response relationship for tobacco use and the risk of the development of oral cancer.

There are 55 carcinogens in cigarette smoke that have been evaluated by the International Agency for Research on Cancer (IARC) and for which there is "sufficient evidence for carcinogenicity" in either laboratory animals or humans.

The long-term prognosis is quite poor, and treatment can lead to further functional and cosmetic problems. Tobacco use, including reverse smoking (smoking with the lit end inside the mouth), chewing of betel quid (a mixture of areca nut, slaked lime, and tobacco wrapped in betel leaf), and use of smokeless tobacco, increases the risk of cancers of the upper aerodigestive tract<sup>24</sup>.

## CONCLUSION

Tobacco use is a major preventable cause of premature death and also a common risk factor to several general chronic diseases and oral diseases. A clear link between oral diseases and tobacco use is evident. Diagnosis of tobacco-induced oral lesions and complications by routine intra oral examination by a dental health professional may prevent serious sequelae. Oral health professionals have the advantage of being in direct contact with patients who are at increased risk and hence their active role in tobacco control initiatives and cessation programmes is important.

**Ethical Clearance:** Not applicable

**Conflicts of Interest:** NIL

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# Soft Tissue and Alveolar Bone Repair of Platelet Rich Fibrin Over Platelet Rich Plasma in Extraction of Impacted Third Molars

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## ABSTRACT

**Aims:** To compare clinically and radiologically the effects of Platelet Rich Fibrin (PRF) over Platelet Rich Plasma (PRP) on alveolar bone repair following extraction of impacted third molars

**Materials and Method:** This study included split mouths of 25 patients who underwent bilateral extraction of impacted third molars. PRF and PRP were prepared at the same appointment, and was placed in the right and left extracted sockets, respectively. Post operative follow up of the soft tissue healing and hard tissue healing were recorded and was then compared between the two sites of the same patient.

**Results:** The mean values of soft tissue healing and the mean values of bone density measured post operatively was better and statistically significant in PRF group as compared to PRP group.

**Conclusion:** PRF is clinically and statistically significant in soft tissue healing and also has faster regeneration of bone when compared with PRP.

**Keywords:** *Impaction, PRF, PRP, Platelet growth factors*

## INTRODUCTION

Impaction is defined as the tooth that has failed to erupt completely or partially to its correct position in the dental arch and its eruption potential has been lost. Third molar eruption and continuous positional changes are related to race, nature of diet, intensity of use of the masticatory apparatus and possibly due to genetic background. Mandibular third molars impaction has difficulties in the degree of extraction along with different risk of complications. Impacted third molar surgery performed by an oral surgeon. The most common post operative complications are pain, trismus,

swelling, infection at the surgical site, alveolar osteitis etc<sup>1</sup>. Developing a strategy to reduce the post operative complications and risks is of prime importance to oral and maxillofacial surgeons.

Healing is the process by which the injured tissues are cured and its integrity is restored. During healing cellular communications occur by means of specialised proteins termed as 'cytokines.' The proliferation of cells is stimulated by 'Growth factors', which are a subclass of cytokines<sup>2</sup>.

Platelets, also called thrombocytes, are the components of blood which are involved in the coagulation of blood. Platelets are activated by the coagulation cascade, especially thrombin and sub endothelial collagen and thereby a number of growth factors are released into the wound site<sup>3</sup>. These in turn activate the proliferation and differentiation of the local osteoprogenitor cells into bone forming cells leading to the formation of new bone matrix and mineralization.

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Regenerative potential of platelets was introduced by Ross et al in the year 1974<sup>4</sup>. The understanding of this regenerative potential has improved in the past two decades. This has thereby led to the increased therapeutic applications of platelets in its various forms.

Platelet rich plasma an autologous concentrate of platelets is a proven source rich in platelet derived growth factors (PDGFs) and transforming growth factors beta 1 and 2<sup>1</sup>. By combining with calcium chloride and and thrombin, PRP releases growth factors. PRP also favours stabilised coagulation of blood, owing to the rich concentration of fibrinogen, thereby favouring regeneration of osseous defects at an early stage.

Platelet Rich Fibrin (PRF) is a new generation of platelet concentrates which is obtained without adding anticoagulants like heparin, bovine thrombin etc. During the production of platelet rich fibrin, other cellular elements like leukocytes are activated, in addition to platelets<sup>5</sup>. Once the artificial hemostatic and inflammatory phenomenon has been induced by centrifugation, cytokines are released. The PRF then regulates inflammation and stimulates immune process of chemotaxis.

Studies on PRP and PRF efficacy in enhancing wound healing in oral and maxillofacial surgery have yielded varied results and divergence of opinion on the activity. The majority of these studies have focused on enhancing graft healing and dental implants. There are very few studies comparing the effects of PRF and PRP on extracted socket. This cross-over design greatly enhances the statistical power and validity of the study. The use of this study design is highly desirable when comparing factors in the same patient.

The study was based on the hypothesis that there is a significant difference between PRF and PRP on alveolar bone repair following extraction of impacted third molars.

The aim of the study is to compare clinically and radiologically the effects of Platelet Rich Fibrin (PRF) over Platelet Rich Plasma (PRP) on alveolar bone repair following extraction of impacted third molars

## METHODOLOGY

This was a non randomised experimental study conducted on 25 patients with bilateral completely impacted mandibular third molars attending the O.P at the Department of Oral Surgery in Sree Balaji Dental College & Hospital Chennai

Ethical committee clearance from the institution was obtained prior to the study.

The patients were thoroughly informed, explaining the advantages and disadvantages of the treatment modalities. The patients had to give informed consent or refusal regarding participation in the study. The patient information was documented.

### Inclusion Criteria

- Patient's in the age group of 18 to 40 years
- Patients with bilateral, impacted mandibular third molars requiring extractions.

### Exclusion Criteria

- Patients with infections or lesions such as pericoronitis, periapical infection, with respect to impacted third molars
- Patients with supra erupted maxillary third molars with traumatic occlusion or impinging on the lower arch
- Patients who were smoker and or alcoholic
- Immunocompromised patients or patients with any systemic diseases
- Those on recent antibiotics or steroid use

Surgical removal of impacted third molar was done. After obtaining the consent 12 ml of patient's blood was drawn in a vacutainer and with help of centrifugation PRP and PRF were made in same appointment and placed in extracted third molar sockets, respectively. PRF was placed on the right side and PRP on the left side.

**Measurement of outcome variables:** Assessment of patients was done postoperatively for the assessment of soft tissue healing and radiographic assessment for bone healing was conducted after 1, 2, and 6 months. All the patients received identical postoperative medications and instructions.

Soft tissue healing -assessment of the areas around the soft tissue of the extracted third molar socket was done and scored as per the Landry and Turnbull index.<sup>6</sup>

Bone healing -assessment of the healing of the bone in the third molar extraction socket was measured in terms of three parameters as per index given by Kelly et al.<sup>7</sup>

The bone healing parameters used were:

1. Lamina Dura
2. The Overall density and
3. The Trabecular pattern

## RESULTS

**Table 1: Comparison of soft tissue healing between PRF and PRP**

Mean values of soft tissue healing (Paired T test )				
	Mean	N	SD	SEM
PRF side	4.5500	25	0.58828	0.12577
PRP side	4.1100	25	0.89781	0.20541
	Paired differences mean	t	df	Sig
PRP to PRF	0.4400	4.287	17	0.001

**Table 2: Comparison of alveolar bone healing between PRF and PRP**

Mean values of bone tissue healing (Paired T test )				
	Mean	N	SD	SEM
PRF side	157.2587	25	9.86965	2.26576
PRP side	146.1429	25	10.27541	2.63256
	Paired differences mean	t	df	Sig
PRP to PRF	11.1158	5.287	18	0.001

Both the soft tissue and bone healing index showed significant difference between PRP and PRF group with PRF being better comparatively which was statistically significant too

## DISCUSSION

Surgical removal of impacted mandibular third molars is the most frequent procedure performed by oral surgeons. This procedure maybe associated with considerable post operative complications including pain, trismus, oedema, surgical site infection etc<sup>8,9</sup>. The purpose of this study was to assess and thereby compare the effects of platelet rich plasma (PRP) and platelet rich fibrin (PRF) on soft tissue healing and bone formation following the removal of impacted mandibular third molar sockets

In Split mouth of 25 patients, evaluations pertaining to classes of third molar impaction were done (Pell and Gregory classification) before placement of PRP on one side and PRF on the other. The hypothesis of the study was that growth factors could be used to promote wound healing, minimise postoperative complications and thereby enhance patient outcome.

We evaluated the soft tissue clinically using healing index by Landry et al. and our results were in accordance with the study by Y Tejesh et al.<sup>10</sup> in which they found a significant difference in the healing potentials of PRP

and PRF and they found PRF to be better (Table 1). The results being similar to the study conducted by Y Tejesh et al. and also in accordance with the study conducted by Hatakeyama et al<sup>11</sup>

He et al. conducted a study to evaluate and compare the effect of biologic features of PRP and PRF on proliferation and differentiation of rat osteoblasts.<sup>12</sup> It was observed that PRF demonstrated controlled and long-term release of the growth factors as compared to PRP. Furthermore, PRF showed better effects on the proliferation and differentiation of rat osteoblasts as compared to PRP. This is in supportive of our study results showing better bone healing in PRF side compared to PRP side (Table 2).

In our study, it was observed that the healing of extraction socket in terms of hard as well as soft tissue was faster in the PRF group which leads us to derive a similar conclusion. The study clearly indicates that both PRP and PRF show improved soft tissue and bone healing at the third molar extraction sockets when used as graft materials.

PRP and PRF contain growth factors in concentrated form. PRP or PRF when placed in the extraction sockets release PDGF, transforming growth factor-beta, fibroblast growth factor, vascular endothelial factor, and numerous other proteins that facilitate soft and hard tissue healing, collagen production and improve wound strength.

## CONCLUSION

To conclude from the study conducted, PRP and PRF has beneficial effects on the improvement of bone formation, soft tissue healing and reduction of pain after mandibular third molar impaction surgery. PRF attributed to be a better platelet concentrate, in promoting soft tissue healing and osseous regeneration than PRP.

The improvement of soft tissue wound healing, decrease in pain and increase in bone formation signifies and highlights the use of PRF as a valid method in promoting an accelerating soft and hard tissue regeneration, over the use of PRP.

The method of procuring PRF is easy as compared to that of procuring PRP. PRF also has better tissue handling properties. A long-term follow-up along with histological study of the bone is required for further assessment of the efficacy of various graft materials.

**Conflict of Interest:** None

**Ethical Clearance:** Institution ethical committee approval obtained

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# Workplace Spirituality and its Impact on Organizational Commitment and Employees' Job Satisfaction amongst Higher Educational Institution Teachers

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## ABSTRACT

This research was planned to ascertain the impact of workplace spirituality towards organizational commitment and employees' job satisfaction amongst Higher Educational Institution Teachers. The organizational commitment and job satisfaction has been treated as dependent variables and workplace spirituality constituted the independent variable for the research. The research employed normative survey method and mix sampling technique for the purpose of investigation. The investigator used self-constructed workplace spirituality questionnaire, organizational commitment scale and Job Satisfaction Scaletto collect personal information and to measure workplace spirituality, organizational commitment and job satisfaction amongst Higher Educational Institution Teachers. This research employed Analysis of Variance (ANOVA), Pearson Product Moment Correlation Coefficient and linear regression analysis to obtain the results. The research revealed that there was statistical significant and positive relationship of workplace spirituality with organizational commitment and job satisfaction and further revealed that there was positive and significant impact of workplace spirituality towards organizational commitment and job satisfaction amongst Higher Educational Institution Teachers.

**Keywords:** *Workplace Spirituality, Organizational Commitment, Job Satisfaction, mix sampling, normative survey method*

## INTRODUCTION

The strength of every nation is system of education in which teachers occupy vital place. The most vital factors in achieving the goals of the organization are human resources. In educational organizations, the most important human resources are teachers who not only function as a guide and facilitator for acquisition of knowledge but also an inculcator of values and transformer of inner being. They also have to nourish the young minds to be a great one. Employees of the future need to demonstrate to the organizations that they can add value to the organization. This is not an easy task as only the best can bring out the best in us. Thus, to produce quality individuals, we need quality teachers. In recent years, spirituality has become an important part of our lives as well as workplace. Spirituality is considered as one of the key factors for the success of the educational organizations and ultimately for the professional life of the teacher. When people have high spirituality in the workplace, it may be more responsible for the organization and they have a high loyalty<sup>1</sup>.

It was prospective that highly satisfied teachers will be more committed to their respective educational institutions resulting into larger withholding and weakening in their turnover rates. In today's era, there is desperate requirement of extremely satisfied, fulfilled, creative, committed and dynamic teachers in an organization to attain and survive their competitive growth. But teachers were feeling stressed, discouraged and insecure due to unstable work environment characterized by downsizing and new technologies in their institutions. So, all these uncertainties prepare them to quest for spiritual manifestation. It appears that unfulfilled spiritual needs inspire teachers of today's educational institutions to gaze for the actual meaning in their lives. Therefore, the spiritual outlook was producing alteration in the workplace values endorsing cooperative teamwork rather than panic at the workplace. People work with not only their hands, but also their hearts (spirit). It was when people work with their hearts or spirit that they find meaning and purpose, a kind of fulfillment that means the workplace can be a place where

people can express their whole or entire selves and be fulfilled. Enabling the expression of human experience at its deepest, most spiritual level may not only reduce stress, conflict, and absenteeism, but also enhance work performance<sup>3</sup>. Spirituality was seen increasingly as an important factor in the workplace<sup>1, 3</sup>. Thus, training programs that incorporate a spiritual dimension enable the development of the whole person, and not just the “head” and “hands.” Developing our spiritual selves means expanding our consciousness so that we might see the world free of normal constraints<sup>7</sup> and setting ourselves free to see more clearly thereby enables opportunities to creatively enrich our relationships with others. In case of academicians, their role goes beyond teaching or imparting knowledge but also require them to involve in character building of students to develop future leaders. Today’s academicians need to keep pace with increasing job demand and rapid acceleration of change which may require them to balance up between inner and outer life to remain healthy and avoid burnout. Workplace spirituality represents an attempt to experience spirituality not only in their personal lives but also at work where they spend a large amount of time. When place of work are able to generate surroundings that are favorable to teachers, be subjected to harmony in conduct and faith, their ethics, and a sense of motive in their profession, a definite configuration of spiritual orientation will appear.

### OBJECTIVES OF THE RESEARCH

To study impact of workplace spirituality towards organizational commitment and job satisfaction amongst Higher Educational Institution Teachers.

**Hypothesis of the Research:** There exists no significant impact of workplace spirituality towards organizational commitment and job satisfaction amongst Higher Educational Institution Teachers.

### Delimitation of the Research

1. The present study was delimited to Agra district of Uttar Pradesh.

2. The study was confined to teachers working in government aided Higher Educational Institutions of Agra district, Uttar Pradesh.

### METHOD OF THE RESEARCH

For the accomplishment of the objectives of the present study, Descriptive survey method was employed, which was concerned with investigation of the phenomena in the natural settings. The organizational commitment and job satisfaction were dependent variables and workplace spirituality was independent variable for the research. For the purpose of collecting data the investigator selected seven government aided Higher Educational Institutions of Agra District, Uttar Pradesh, India through accidental non- probability method of sampling technique. The list of selected Higher Educational Institutions of Agra district Uttar Pradesh are Agra College, Dayalbagh Educational Institute, R.B.S College, St. John’s College, Institute of Social Sciences, Baikunthi Devi College and B.D Jain College respectively and 420 teachers of six academic streams (arts, science, commerce, engineering, social science and education) from seven government aided Higher Educational Institutions of Agra district, Uttar Pradesh, India were selected through Random sampling technique. As a whole, mix sampling method of sampling technique was applied. This research employed Analysis of Variance (ANOVA), Pearson Product Moment Correlation Coefficient and linear regression analysis to obtain the results. The investigator used self-constructed workplace spirituality questionnaire, organizational commitment scale<sup>2</sup> and Job Satisfaction Scale<sup>1,2</sup> to collect personal information and to measure workplace spirituality, organizational commitment and job satisfaction amongst Higher Educational Institution Teachers

### FINDINGS OF THE RESEARCH

To determine the impact of workplace spirituality towards organizational commitment and job satisfaction amongst Higher Educational Institution Teachers, linear regression analysis was carried out with the help of correlation analysis. Correlation matrix was formed which shows inter-correlation among the variables of the research shown in Table 1:

**Table 1: Correlation Matrix exhibiting relationship amongst workplace spirituality, organizational commitment and job satisfaction**

Variables	Workplace spirituality	Organizational commitment	Job satisfaction
Workplace Spirituality	1		
Organizational commitment	0.536**	1	
Job satisfaction	0.489**	0.271*	1

\*\*Significant at 0.01 level, \* Significant at 0.05 level

The matrix of coefficient of correlation Table 1 indicates that workplace spirituality and organizational commitment scores have significant and positive correlation ( $r = 0.536$ ). There was also significant and positive correlation found between workplace spirituality and job satisfaction ( $r = 0.489$ ). There was slight and positive correlation found amongst job satisfaction and organizational commitment ( $r = 0.271$ ). Correlations were calculated to determine to what extent workplace spirituality correlated with organizational commitment and job satisfaction. As can be seen in Table 2, significant positive correlations were formed among all three variables. This results shows that there was strong relationship between workplace spirituality, organizational commitment and job satisfaction amongst Higher Educational Institution Teachers<sup>6, 8, 9</sup>.

The result from the correlation in Table 1 fulfills the required conditions for regression analysis. Thus, the regression analysis can be carried out here. Linear regression analysis is used to determine the contribution of the independent variable which is workplace spirituality towards dependent variables which are organizational commitment and job satisfaction amongst Higher Educational Institution Teachers.

Table 2 and 3 reveals the results of linear regression analysis which gives contributory role of workplace spirituality towards organizational commitment and job satisfaction. The linear regression analysis shows that the independent variable which is workplace spirituality is the indicator with correlation ( $r = 0.536$ ) and the value of  $R^2$  ( $R^2 = 0.288$ ) contributes 28.8% towards organizational commitment amongst Higher Educational Institution Teachers.

**Table 2: Analysis of Linear Regression between Workplace spirituality towards Organizational Commitment**

Model	r	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard error	β	Contribution (%)
1	0.536	0.288	0.282	0.595	0.419	28.8%

**Predictor:** workplace spirituality

**Dependent variable:** Organizational commitment

The contribution of workplace spirituality towards organizational commitment amongst Higher Educational Institution Teachers forms the linear regression as:

$$Y = 2.604 + 0.419X_1 + 0.595$$

$$Y = \text{Organizational Commitment}$$

$$X_1 = \text{Workplace spirituality}$$

$$\text{Constant } 2.604$$

$$\text{Standard Error } 0.595$$

The linear regression analysis showed that workplace spirituality contributes 28.8 % towards organizational commitment amongst Higher Educational Institution Teachers. This means that 28.8% variation in the organizational commitment can be explained by the workplace spirituality. The above regression equation showed positive impact of workplace spirituality towards organizational commitment<sup>1, 3</sup>.

For testing the significance of regression model ANOVA has been applied which is shown in Table 3:

**Table 3: Analysis of variance results for workplace spirituality and organizational commitment**

Source	Sum of Squares	df	Mean square	F-ratio	Level of significance
Regression	18.607	1	18.607		
Residual	46.064	418	.110	169.15	Significant at 0.01 level
Total	64.670	419			

It was found that F-ratio is 169.15 which exceeds table value ( $= 2.59$ ) at 0.01 level of significance. Thus, null hypothesis was rejected that there exist no significant impact of workplace spirituality towards organizational commitment amongst Higher Educational Institution Teachers.

analysis which gives contributory role of workplace spirituality towards job satisfaction. The linear regression analysis shows that the independent variable which was workplace spirituality is the indicator with correlation ( $r = 0.489$ ) and the value of  $R^2$  ( $R^2 = 0.239$ ) contributes 23.9% towards job satisfaction amongst Higher Educational Institution Teachers<sup>5</sup>.

Table 4 showed the result of linear regression

**Table 4: Analysis of Linear Regression between workplace spirituality towards Job Satisfaction**

Model	r	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard error	β	Contribution (%)
2	0.489	0.239	0.233	0.615	0.332	23.9%

**Predictor:** workplace spirituality

**Dependent variable:** Job Satisfaction

The contribution of workplace spirituality towards job satisfaction amongst Higher Educational Institution Teachers forms the linear regression as below:

$$Y = 3.080 + 0.332X_1 + 0.615$$

Y = Job satisfaction

X<sub>1</sub> = workplace spirituality

Constant 3.080

Standard Error 0.615

The linear regression analysis shows that workplace spirituality contributes 23.9 % towards job satisfaction amongst Higher Educational Institution Teachers. This means that 23.9% variation in the job satisfaction can be explained by the workplace spirituality. The above regression equation shows positive impact of workplace spirituality towards job satisfaction.

For testing the significance of regression model ANOVA has been applied which is shown in Table 5:

**Table 5: Analysis of variance results for workplace spirituality and job satisfaction**

Source	Sum of Squares	df	Mean square	F-ratio	Level of significance
Regression	18.607	1	18.607		
Residual	46.064	418	.110	169.15	Significant at 0.01 level
Total	64.670	419			

It was found that value of F-ratio is 132 which exceeds table value (=2.59) at 0.01 level of significance. Thus, null hypothesis was rejected that there exist no significant impact of workplace spirituality towards job satisfaction amongst Higher Educational Institution Teachers.

From the linear regression analysis it was inferred that workplace spirituality contributed the most towards organizational commitment which was 28.8%, followed by 23.9% towards Job Satisfaction amongst Higher Educational Institution Teachers.

**CONCLUSIONS AND RECOMMENDATIONS OF RESEARCH**

1. It was also inferred that there was significant and positive relationship found amongst workplace spirituality with organizational commitment and job satisfaction whereas job satisfaction has slightly positive relationship with organizational commitment.
2. There was positive and significant impact of workplace spirituality found towards

organizational commitment and job satisfaction amongst Higher Educational Institution Teachers which emerges from regression analysis. It was also inferred that workplace spirituality contributed the most towards organizational commitment which is 28.8%, followed by 23.9% towards job satisfaction amongst Higher Educational Institution Teachers and remaining percentage of 47.3% can be explained by other variables which can be further investigated for future research<sup>5,13</sup>.

3. Workplace spirituality was identified as a significant contributor to organizational commitment and job satisfaction amongst Higher Educational Institution Teachers. Therefore, it was recommended that Higher Educational administration must take steps to enhance conducive environment of workplace spirituality for teachers.
4. This research also recommends arrangements of workshops and sessions on yoga, meditation and other relaxation practices and behavioral, technical and leadership training for the Higher Educational Institution Teachers to enhance their abilities.

5. It recommends minimization of exertion, simplification of guidelines, rules and procedures, recruitment of competent, well-educated and competent teachers identifying a good work offering frequent and non-critical feedback to teachers on their enactment for self-development to overcome inadequacies.
6. This research additionally advocates constitution of personnel management team in each institute to resolve work related concerns of teachers, to identify, analyze and resolve work related problems of teachers leading to expansion in their full performance and enrichment of their work life which will lead to enhancement in their total performance and enrichment of their work life and also avoidance of political interference in the management and administration of college.
7. Procedural justice and the degree of fairness in the procedures by which rewards were disseminated amongst employees by the organization directly influence an employee's degree of satisfaction. Therefore, it was recommended that the organization's rules, policies and procedures should be unbiased and justifiable.

**Ethical Clearance:** Not required as per study

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**Conflict of Interest:** NIL

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# The Role of MRI in Non-Traumatic Chronic Hip Joint Pain

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## ABSTRACT

MRI is changed the face of diagnostic techniques, it has been used for diagnosing the hip pathologies & is the earliest applications of MRI in diagnosing musculoskeletal disorders. MRI detects articular, extra articular and osseous pathologies in hip joint. Thus is important in diagnosing the cases of chronic hip pain which indicates a long list of causes. MRI is also the investigation of choice for imaging avascular necrosis, radiographically occult fractures, marrow replacement disorders, musculoskeletal neoplasms, and various arthritides involving the hip joint.

This study was designed to assess the role of MRI in non-traumatic chronic hip joint pain in adult age group, carried out at Department of Radio Diagnosis, Krishna Institute of Medical Science Karad, Maharashtra. The study included 54 patients with hip pain who were evaluated by plain radiograph and MRI.

Majority (42.59%) of the patients were from the age group of 31 – 50 years, majority of the patients, 36 were males (66.67%). Most common chief complaint was unilateral hip pain (79.6%), and most common pathology found was avascular necrosis in 27 cases (50 %). There was no significant association between the age groups and AVN ( $p=0.582$ ), while gender showed significant association with AVN ( $p = 0.021$ ). Plain radiograph was abnormal in 41 out of total 54 cases (75.93%). The accuracy of detecting etiology by MRI in current study was 96.2 % as compared to plain radiograph was 75.9 % in current study. Thus MRI was seen to be more effective in diagnosing cases of painful hip joint where plain radiographs may be entirely normal.

**Keywords:** MRI, AVN, X ray, hip joint.

## INTRODUCTION

One of the most revolutionary advances in the field of medicine that has essentially changed the face of diagnosis is Magnetic Resonance Imaging (MRI). One of the earliest reported use of musculoskeletal magnetic resonance imaging (MRI) is imaging of the hip. In the

last few years, advantages such as reduced scan time and better image quality have significantly widened the scope of MRI<sup>1</sup>.

MRI is a highly specific and sensitive technique for detecting a number of abnormalities involving the hip and surrounding tissues i.e. it helps in evaluation of articular, extra articular and osseous structures which can be affected by hip pathology. The hip is an important weight-bearing joint. Hip pain is an indication with a long list of etiologies including intraarticular, periarticular and extraarticular disorders<sup>2</sup>.

The exact origin of hip pain determination can be quite challenging<sup>3</sup>. Therefore, to maintain an awareness of neighboring structures as well as of the hip is important<sup>5</sup>. In the absence of known acute trauma, hip pain is a common diagnostic problem<sup>4</sup>.

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MRI is also the modality of choice for imaging avascular necrosis, radiographically occult fractures, marrow replacement disorders, musculoskeletal neoplasms, and various arthritides involving the hip joint<sup>6</sup>.

**MATERIALS & METHOD**

**Study Population:** An observational & cross sectional study was carried out on 54 patients over a period of 2 years from November 2016 to November 2018. Institute Ethics Committee Clearance was obtained before the start of the study.

**Inclusion Criteria:**

- Both sexes
- Patients of adult age group (above 19 year old).
- Non-traumatic clinically suspected cases of chronic hip joint pain: patients with unilateral or bilateral groin, buttock, thigh or knee pain, deformity or limitation of range of hip movement.

**Exclusion Criteria:**

- Patients with history of trauma
- Patient having claustrophobia.
- Patient having history of metallic implants insertion, cardiac pacemakers and metallic foreign body in situ.
- Patients with previous history of hip surgery.

MRI was performed using MAGNETOM AVANTO 1.5-TESLA Tim + Dot MR System. All the patients undergone conventional hip AP and lateral radiographs on ALLENGERS MARS 50 preceding the MRI examination.

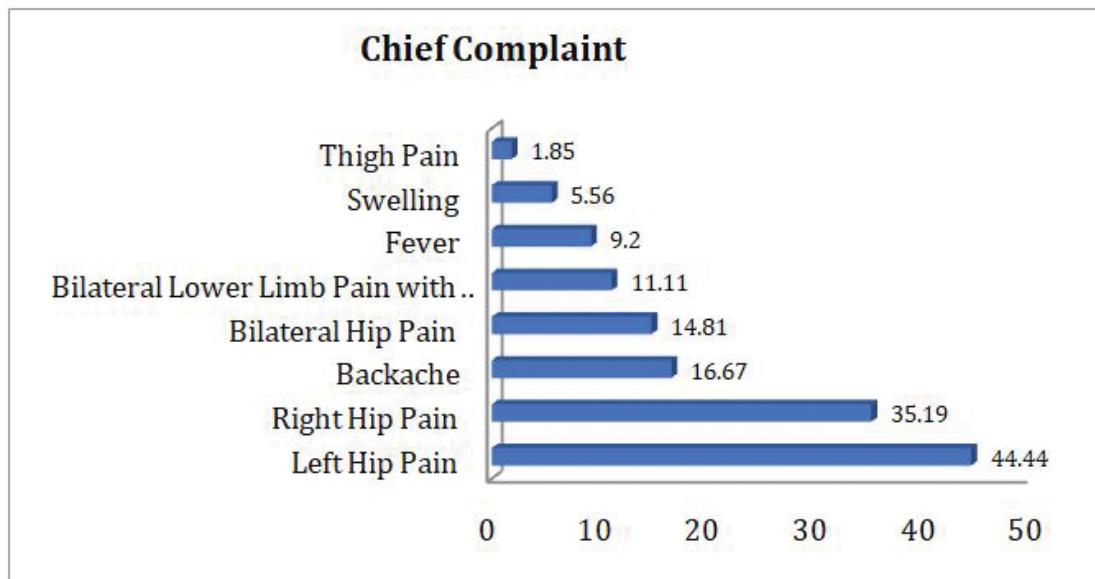
The patient was asked to lie in supine position with the hip in close relation to the array surface body coil and both hips were examined simultaneously. Spin-echo T1-weighted (coronal/sagittal), PD FAT SAT (coronal/axial), T2-weighted (oblique sagittal) sequences of both hips sequences were performed. Intravenous contrast (Gadolinium @ 0.1mmol/kg) was administered when thought necessary based on the MRI findings.

**RESULTS**

Fifty four patients with unilateral or bilateral hip pain of adult age groups and both sexes were studied by plain radiograph and MRI scan.

Most of patients i.e. 23 (42.59%) in our study were from 31 – 50 years of age, followed by more than 50 years 18 (33.33%) and lastly 19 – 30 years 13 (24.08%). Majority of the patients, 36 were males (66.67%) and rest 18 (33.33%) were females. The ratio of male: female came out to be 2:1.

The most common chief complaint in our patients was unilateral hip pains in 43 (79.6%) patients {(Left Hip Pain-24 (44.44%) followed by Right Hip Pain -19 (35.19%) patients}. Other presenting complaints were Backache 9 (16.67%), Bilateral Hip Pains 8 (14.81%), and Bilateral Lower Limb Pains with limitation of limb movements 6 (11.11%), fever 5 (9.2%), Swelling 3 (5.56%) and Pain in the thighs 1 (1.85%) patients respectively.



**Fig. 1: Chief complaints of the study participants**

**Table 1: Different pathological diagnosis on MRI in study participant**

Diagnosis	Number	Percentage* (%)	
AVN (total)	27	50%	
Secondary osteoarthritis	13	24.07	
Stress fracture	1	1.8	
Sacral Insufficiency Fracture	1	1.8	
Transient Osteoporosis	2	3.7	
Sacroilitis	3	5.55	
Infective	Pyogenic arthritis	1	1.8
	Synovitis with Joint effusion	1	1.8
	Abscess	1	1.8
	TB Arthritis	1	1.8
	Joint effusion	2	3.7
	Osteomyelitis	1	1.8
Primary bone tumours	spindle cell sarcoma	1	1.8
	Enchondroma	1	1.8
	Osteoid osteoma	1	1.8
	Aneurysmal bone cyst	1	1.8
	Osteochondroma	2	3.7
	Simple bone cyst	1	1.8
Metastases	2	3.7	
Multiple Myeloma	2	3.7	
Normal (in degenerative spine)	2	3.7	

The study revealed pathological findings in 52 patients. Out of which the most common finding encountered in our study was avascular necrosis (50 %). Followed by Sec. Osteoarthritis (24.07%). All the tumours (including primary and secondary) together constituted 20.37% while infective pathologies 12.96 % of the patients

AVN was seen in half cases (27 cases – 50%), Majority of the AVN cases- 13 (48.15%) were from age group of 31 – 50 years, more than 50 years of age had 9 (33.33%) of cases and rest 5 (18.52%) were from 19- 30 years. In 27 cases without avascular necrosis, majority of patients 10 (37.04%) were from the age group of 31- 50 years, 8 (29.63%) were from 19-30 years and rest 9 (33.33%) were from more than 50 years of age. There was no any association between age groups and presence of pathologies especially Avascular necrosis (p = 0.582) in current study.

**Table 2: Association between Gender and AVN**

Gender	AVN	Other than AVN
Males	22 (81.48%)	14 (51.85%)
Females	5 (18.52%)	13 (48.15%)
Total	27 (100%)	27(100%)

$X^2= 5.333$   $p = 0.021$

We saw more number of males in our study -22 with AVN than females - 5. There was significant association between presence of AVN and gender. (p=0.021).

Out of the 27 AVN cases, we had majority- 12 (44.44%) patients with left hip AVN, Right hip AVN was seen in 11 (40.74%) cases and bilateral was seen in 4 (14.82%) cases. So in total we had 27 + 4 = 31, 31 total number of hips with AVN.

**Table 3: Staging of Avascular necrosis**

Staging	Number of Hips*	Percentage (%)	
Stage 0	00	0%	
Stage I	2	6.45 %	
Stage II	a	2	6.45 %
	b	4	12.9 %
Stage III	6	19.35 %	
Stage IV	13	41.93 %	
<b>Total Hips with AVN</b>	31	100%	

\*Total Number of Hips = 27 + 4 = 31

Majority of our patient’s hips (41.93%) were from stage IV of AVN, while others were in stage II (19.35 %), Stage III (19.35 %) and stage I (6.45 %).

**Table 4: Diagnosis on plain radiographs**

Diagnosis	No. of Patients (N = 54)	Percentage
Avascular Necrosis	13	24.07%
Osteoarthritis	13	24.07%
Primary Neoplasms	7	12.96%
Metastasis	2	3.70%
Multiple Myeloma	2	3.70%
Abscess	1	1.85%
Infection	2	3.70%
Sacroilitis	1	1.85%
Normal	13	24.07%
Total	54	100%



Out of a total of 54 cases, Plain radiographs were abnormal in 41 patients (75.93%) and normal in remaining 13 cases (24.07%), with most common diagnosis seen as AVN and Osteoarthritis in 13 patients each (24.07%).

**Table 5: Correlation of Plain Radiographs with MRI**

		MRI		Total
		Normal	Abnormal	
Plain Radiograph	Normal	2 (3.70%)	11 (20.37%)	13 (24.07%)
	Abnormal	0 (0%)	41 (75.93%)	41 (75.93%)
Total		2 (3.70%)	52 (96.30%)	54 (100%)

Out of all 52 (96.30%) abnormal cases detected on MRI, plain radiograph was abnormal in 41 patients, 11 cases more (20.37%) were seen on MRI. Sensitivity of x ray in comparison with MRI was 78.8 % and Specificity was 100%.The accuracy of detecting etiology by MRI was 96.2 % as compared to plain radiograph is 75.9 % in our study

**DISCUSSION**

The hip is a primary weight-bearing joint. Hammer mentioned that in absence of known acute trauma, hip pain is a common diagnostic problem with many etiologies.MRI is the most sensitive mean of diagnosing AVN, representing the gold standard of non-invasive diagnostic evaluation.

Fifty four patients were evaluated, whose age group range from 19 years and above, in which majority 23 (42.5 %) from age group of 31-50 years, followed by more than 50 years (33.33%) and then 19 – 30 years (24.08%). Similar age wise distribution was seen in Tushar etal<sup>8</sup>study. The study by Arvindkumar etal<sup>9</sup> had most of the patients from 41- 50 years of age group similar to the current study.In the present study, out of 54 patients, majority were (66.67%) males and rest (33.33%) females. Male predominance was seen in the study by Arvindkumaretal<sup>9</sup>, similar to the current study. Male: female ratio = 2:1. Mitchell et al <sup>10</sup>got a gender ratio of 1.43:1 and Beltran et al <sup>11</sup> got 1.7:1. Thus, in our study, we got a slightly higher gender ratio.

The commonest chief complaint in our patients was chronic hip pain. Out of 54 cases, unilateral hip pain (79.6%) {(Left Hip Pain (44.44%) followed by Right Hip Pain (35.19%)}. Other presenting complaints were Backache (16.67%), Bilateral Hip Pains (14.81%), Bilateral Lower Limb Pains with limitation of limb movements (11.11%), fever(9.2%), Swelling(5.565) and Pain in the thighs (1.85%).). The study by Venkateshet al<sup>12</sup>, had 57.6% who had unilateral pain while in our

study there were 79% patients with unilateral hip pains which is higher.

In the current study we come across with a wide range of lesions who presented with chronic hip pain. Out of 54 patients who were evaluated, the most common finding encountered in our study was avascular necrosis (50 %). Followed by Sec. Osteoarthritis 13 (24.07%). All the tumours (including primary and secondary) together constituted 20.37% while infective pathologies 12.96 % of the patients.Ragab<sup>13</sup> et al studied 34 patients with hip pain using MRI and found similar spectrum of disease conditions prevalent in the population.

In our study, avascular necrosis (AVN) turned-out to be the most common hip pathology i.e. 27 (50%) with age varying from 19 to 70 years. The most common involved age group was 31 – 50 years, which comprised (48.15 %) of the cases which was similar to Khanna et al <sup>14</sup>and Kamal <sup>15</sup> studies.

In our study, we saw more number of males (81.485 %) with AVN than females (18.52%). There was significant association between presence of AVN and gender. (p=0.021). Study by Patterson etal<sup>16</sup> on AVN had 83% male and 17% female patients.

In the present study, AVN was present unilaterally in 23 patients (42.59%) and bilaterally in 4 patients (14.82%). These results were similar to the study by Patterson etal<sup>16</sup>. They concluded that, bilateral AVN was found in 64% cases, however bilateral AVN may not match in their class, so either AVN is developing with different speediness in both hips or it may have been started early in one hip. Majority of our patient’s hips (41.93%) were in stage IV of AVN, while others were in stage II (32.25 %), Stage III (41.93%) and stage I (6.45 %).

In the present study, stage-4 was the most common stage of AVN present in 13 (41.94%) of the cases followed by stage II (32.25 %) {Stage II a = 4(12.9 %) &

stage II b = 6 (19.35 %)}, Stage III (19.35 %) and stage I (6.45 %). In current study, most of the patients (61.2%) were from advanced disease i.e. stages III and IV. Kamal et al<sup>15</sup>. In his study found that majority (85.87%) were diagnosed in advance evolutionary stages of disease, stage 3 and stage 4.

Beltran<sup>11</sup> stated that in early stages of avascular necrosis, diagnosis with the help of conventional radiography is difficult. Hence, MR imaging is often used. Thus, the two main goals in MR imaging evaluation of early avascular necrosis are: determination of (a) extent of involvement of femoral head pathology and (b) percentage of femoral head involved segment.

In our study the 2nd common pathology was Sec. Osteoarthritis 13(24.0%), the study by Venkateshetal<sup>12</sup>, had 11% of osteoarthritis. In the present study, bone marrow edema was found in 37 (68.5%) of the cases. All patients having bone marrow edema had hip pain. KooKHetal<sup>17</sup> in their study established that combination of AVN femoral head and bone marrow edema is strongly associated with hip joint pain.

We had 7 cases with Infective etiology (12.96%) including pyogenic arthritis (1.8%), Synovitis with Joint effusion (1.8%), abscess (1.8%), Tubercular Arthritis (1.8%), osteomyelitis (1.8%) and isolated joint effusion (3.7 %). The study by Tushar et al<sup>8</sup>, had 12% patients with infection which is slightly less than the current study. In the study by Chevrot et al<sup>18</sup> had majority cases of infective etiology.

Out of all 54 cases in our study, MR showed abnormality in 52 cases where as plain radiograph was abnormal in 41 patients. All the 41 patients with abnormal plain radiographs had an abnormal MRI study. Only 2 out of 13 patients had normal plain radiographs and normal MRI. Sensitivity of x ray in comparison with MRI was 78.8 % and Specificity was 100%.

The apparent sensitivity of plain radiographs is higher than reported in other cases/studies as the patient's inclusion criteria was painful hip conditions and exclusion of normal individuals.

The accuracy of detecting etiology by MRI in current study was 96.2 % as compared to plain radiograph was 75.9 % in current study.

The similar findings were from study by Huang et al<sup>19</sup>.

**Conflicts of Interest:** None.

**Source of Funding:** KIMSDU

**Ethical Clearance:** Institutional Ethical Committee, KIMSDU.

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# Computed Tomography Evaluation of Mediastinal Masses

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## ABSTRACT

**Background:** The mediastinum is an extremely complex area. The multitude of diseases affecting the mediastinum vary considerably, ranging from tumors (benign to extremely malignant) cysts, vascular anomalies, lymph node (LN) masses, mediastinitis, mediastinal fibrosis, and pneumo-mediastinum. The differential diagnosis of a mediastinal mass on CT is usually based on several findings, including its location, identification of the structure from which it is arising. Hence the present study was done to assess the role of multi-detector CT in detection and evaluation of mediastinal masses.

**Material & Method:** 51 patients with the clinically suspected cases of mediastinal masses or who had a chest radiograph with suspicion of mediastinal abnormality. Patients of all age group coming with a mediastinal mass or mediastinal widening on chest x-ray were included. Patients who are hypersensitive to contrast dye and patients with deranged renal parameters were excluded. Somatom emotion 16 slice equipment was used. Plain scan and triphasic scan. Which includes 3 phases viz. Arterial, venous & delayed with 3D reconstruction.

**Results:** Anterior mediastinum comprised of Lymphoma (36.46%), Invasive thymoma (19.2%), thymoma (15.38%), Metastatic lymph nodes (11.53%), Tuberculous lymph nodes (7.69%), sarcoma, malignant teratoma and metastasis. Metastatic lymph nodes (46.15%), Tuberculous lymph nodes (38.46%). Other rare masses in middle mediastinum were, bronchogenic cyst and lymphatic malformation. Extra medullary hemopoiesis (33.33%), Neural tumours (33.33%), Paravertebral abscess (16.66%) and Tuberculous lymph node (8.33%) were the commonest lesions in the Posterior mediastinum.

**Conclusion:** Anterior mediastinal masses formed majority of the total masses while posterior mediastinal masses and middle mediastinal masses comprised 23.52% and 25.49% of the total masses respectively. In which we found that the CT is 95.83% accurate in diagnosing mediastinal masses as compared to histopathological examination. Hence finally we conclude that the use of CT scan greatly expedites the diagnosis process.

**Keywords:** Computed Tomography, Mediastinal Masses, Mediastinal Abnormality.

## INTRODUCTION

The mediastinum is an extremely complex area. The multitude of diseases affecting the mediastinum vary considerably, ranging from tumors (benign to extremely malignant) cysts, vascular anomalies, lymph node (LN) masses, mediastinitis, mediastinal fibrosis, and pneumo-mediastinum<sup>1</sup>. Mediastinal masses span a wide histopathological and radiological spectrum. The most frequent lesions encountered in the mediastinum are thymoma, neurogenic tumours and benign cysts,

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altogether representing 60% of patients with mediastinal masses. Neurogenic tumours, germ cell neoplasms and foregut cysts represent 80% of childhood lesions, whereas primary thymic neoplasms, thyroid masses and lymphomas are the most common in adults<sup>2</sup>.

The differential diagnosis of a mediastinal mass on CT is usually based on several findings, including its location, identification of the structure from which it is arising, whether it is single, multifocal or diffuse, its size and shape, its attenuation, the presence of calcification and its character and amounts, and its opacification following contrast administration.

Hence the present study was done to assess the role of multi-detector CT in detection and evaluation of mediastinal masses, to study the CT characteristics of mediastinal masses in plain and contrast enhanced CT and correlate CT findings with histopathological/MRI/USG findings wherever possible.

### AIM AND OBJECTIVES

- To study the role of multi-detector CT in detection and evaluation of mediastinal masses.
- To study the distribution of mediastinal masses.
- To study the CT characteristics of mediastinal masses in plain and contrast enhanced CT.

- To study the involvement of neighboring structures by mediastinal masses.
- To compare CT findings with histopathological / MRI/USG findings wherever possible.

### METHODOLOGY

All patients referred from department of medicine, surgery, pediatrics and TB & chest disease, to the department of radio-diagnosis with the clinically suspected cases of mediastinal masses or who had a chest radiograph with suspicion of mediastinal abnormality. Minimum of 51 cases were included in the present study. Patients of all age group coming with a mediastinal mass or mediastinal widening on chest xray were included. Patients who are hypersensitive to contrast dye and patients with deranged renal parameters were excluded in study. Equipment used was Somatom emotion 16 slice. Plain scan and triphasic scan. Which includes 3 phases viz. Arterial, venous & delayed with 3D reconstruction.

### RESULTS

The present study was a prospective analytical study, which was conducted among 51 patients diagnosed with mediastinal masses, for their evaluation, by using computed tomography. In the present study, we assessed demographic parameters of the study population, to know the possible etiological relationships with the mediastinal lesions.

**Table 1: Age and Gender Distribution of patients**

Age (years)	Male		Female		Total	
	N	%	N	%	N	%
<20	7	13.73%	4	7.84%	11	21.56%
21-30	7	13.73%	3	5.88%	10	19.61%
31-40	8	15.68%	4	7.84%	12	23.53%
41-50	0	0%	8	15.68%	8	15.68%
51-60	3	5.88%	4	7.84%	7	13.73%
>61	3	5.88%	0	0%	3	5.88%
Total	28	54.90%	23	45.10%	51	100%
Mean ± SD	35.62 ± 12.5 years		36.04 ± 15.10 years		45.7 ± 18.90	

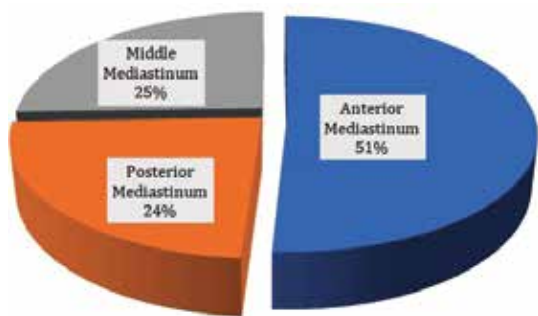
Majority of the patients in the present study were belonged to the age group of 31-40 years, followed by 21.56% in the age group of less than 20 years, 19.61% patients in the age group of 21-30 years. The mean age of the patients was 45.7 ± 18.90 years.

There was a male preponderance in the given study. 54.90 % participants were males while female patients

constituted 45.10 % of sample group, it was not statistically significant.

Present study, we assessed the mediastinal masses according to the site, type of mediastinum involved. Anterior mediastinal masses formed majority of the total masses 50.98% while posterior mediastinal masses

and middle mediastinal masses comprised 23.52% and 25.49% of the total masses respectively.



**Graph 1: Distribution of patients according to Mediastinum Masses**

**Table 2: Distribution of Anterior mediastinal lesions (based on CT findings) (n = 26)**

Anterior mediastinal lesions parameters		Number of cases	Percentage
Diagnosis on CT	Lymphoma	9	34.61%
	Invasive thymoma	5	23.07%
	Thymoma	4	15.38%
	Metastatic lymph nodes	3	11.53%
	Tuberculous lymph nodes	2	7.69%
	Metastasis	1	3.84%
	Malignant teratoma	1	3.84%
	Sarcoma	1	3.84%
Total		26	100%

This study revealed that the majority of the anterior mediastinal masses were Lymphoma (34.61%), followed by Invasive thymoma (23.07%), thymoma (15.38%), Metastatic lymph nodes (11.53%), Tuberculosis lymph nodes(7.69%). Other rare masses in anterior mediastinum were, tuberculous lymph nodes and a single case of sarcoma was also seen. (Table 2)

**Table 3: Distribution of middlemediastinal lesions (Based on CT findings)**

Middle mediastinal lesions parameters		Number of cases	Percentage
Diagnosis on CT	Metastatic lymph nodes	6	46.15%
	Tuberculosis lymph nodes	5	38.46%
	Bronchogenic cyst	1	7.69%
	Lymphatic malformation	1	7.69%

Here it was observed that the majority of the middlemediastinal masses were Metastatic lymph nodes (46.15%), Tuberculous lymph nodes(38.46%). Other

rare masses in middle mediastinum were, lymphatic malformation (7.69%) and bronchogenic cysts (7.69%). (Table 3)

**Table 4: Distribution of posterior mediastinal lesions (Based on CT findings)**

Posterior mediastinal lesions parameters		Number of cases (N)	Percentage (%)
Diagnosis on CT	Extramedullary hemopoiesis	4	33.33%
	Neural tumours	4	33.33%
	Paravertebral abscess	2	16.66%
	Tuberculous lymph nodes	1	8.33%
	Esophageal duplication cyst	1	8.33%

It was found maximum of the posteriormediastinal masses: Extramedullary hemopoiesis among 4 (33.33%) cases, Neural tumours among 4 (33.33%) cases, Paravertebral abscess among (16.66%) cases and Tuberculous lymph node (8.33%) cases and a single case of esophageal duplication cyst (8.33%). (Table 4)

**Table 5: Distribution of various neural tumours**

Neural tumors	Number of cases (N)	Percentage (%)
Neurofibroma	3	75%
Schwannoma	1	25%
Total	4	100%

In the present study, we assessed various neural tumour separately. Thus, it was found out of total 4 neural tumours, 3 were: neurofibroma (75%) while one was schwannoma (25%). (Table 5)

**Table 6: Comparison of CT as a modality for diagnosis of mediastenal lesions (in comparison with histopathology findings)**

		Histopathology diagnosis		Total
		Positive	Negative	
CT Diagnosis	Positive	46	0	46
	Negative	2	0	2
Total		48	0	48

In the present study, It was observed that Out of total 48 cases which were subjected for histopathological confirmation, CT diagnosed 46 cases as correctly, with two cases false negative cases (Table 6)

**Table 7: Sensitivity and specificity of CT scan to diagnose mediastinal lesions**

Parameter	Values
Diagnostic accuracy (Sensitivity)	95.83%

When we assessed the diagnosis given by CT scan as compared to histopathological findings, it was observed that CT scan reports Diagnostic accuracy (sensitivity) of 95.83%, which means that CT is accurate to diagnose 95.83% of mediastinal masses. (Table 7)

## DISCUSSION

Majority of the patients in the present study, majority of the participants (23.53 %) were in 31-40 years, followed by 21.56% (less than 20 years), 19.61% patients in the group of age 21-30 years. Average age of the patients was  $45.7 \pm 18.90$  years. Tetsuro Araki et al<sup>3</sup>, in their study, under Framingham study, observed that the participants with anterior mediastinal masses had a mean age of 62.1 years (median 60.9 years, range 39.0–83.8 years) and 12 were female (52%).

In the present study, we assessed the mediastinal masses according to the site, type of mediastinum involved. Anterior mediastinal masses formed majority of the total masses 50.98% while posterior mediastinal masses and middle mediastinal masses comprised 23.52% and 25.49% of the total masses respectively.

Felsonet al<sup>4</sup>, conducted a case series of 550 cases, they reported more number of cases being seen in the anterior mediastinum followed by posterior and middle mediastinum. In their study, isolated compartmental involvement is common in posterior mediastinum (n=7, 23.4%) followed by superior (n=4, 13.3%) middle (n=4, 13.3%) and anterior mediastinum (n=3, 10%). However the anterior mediastinal is most commonly involved in trans-compartmental lesions (n=12, 40% and n=2, 6.7%). Therefore anterior mediastinum (n=17, 56.7%) was collectively the most common compartment involved, followed by superior mediastinum (n=16, 53.3%), posterior mediastinum (n=9, 30.1%) and middle mediastinum (n=6, 20.0%). On CT imaging, the commonest location of mediastinal mass in our study was the anterior mediastinum and the results are comparable with other studies as well.

In this study, we reported that the majority of the anterior mediastinal masses were Lymphoma

(36.46%), followed by Invasive thymoma (23.07%), thymoma (15.38%), Metastatic lymph nodes (11.53%), Tuberculosis lymph nodes (7.69%). Other rare masses in anterior mediastinum were, tuberculous lymph nodes, a single case of sarcoma was also diagnosed in the anterior mediastinum.

Akshatha Rao Aroor et al<sup>5</sup>, On CT imaging, the commonest location of mediastinal mass in our study was the anterior mediastinum (42.86%), and the results are comparable with other studies as well. Thymoma (40%) was the commonest tumour in the anterior mediastinum, followed by lymphoma (33.3%). The tumours in the order of frequency of occurrence were lymphoma, bronchogenic carcinoma, thymoma, mediastinal tuberculosis, metastatic carcinoma and germ cell tumours. Lymphoma was the commonest mediastinal tumour (12; 34.28%), which is in comparison with the studies done by Vaziri et al., and Adegboye et al<sup>6</sup>. However, thymoma was the most common lesion in study done by Singh et al., and Dubashiet al<sup>7</sup>.

Sergi Juanpere et al<sup>8</sup>, in their study reported that, Lipomas predominantly occur in the anterior mediastinum and are reported to represent 1.6–2.3% of all primary mediastinal tumours. At CT, lipomas have homogeneous fat attenuation of approximately -100 HU. In the present study, we could not observe lipomas in anterior mediastinum.

In this study, we reported that the majority of the middle mediastinal masses were Metastatic lymph nodes (46.15%), Tuberculous lymph nodes (38.46%). Other rare masses in middle mediastinum were, Neuroenteric cyst, bronchogenic cyst. All the masses were assessed with the help of computed tomography. All of the middle mediastinal lesions were having heterogeneous enhancement pattern (100%) on computed tomography. 100% cases did not show calcification or mass effect among the lesions on CT. In the present study, we also found one case of sarcoma, which was initially diagnosed as lymphoma, later on histopathology, it was confirmed to be sarcoma.

Akshatha Rao Aroor et al<sup>5</sup>, Middle mediastinal involvement was seen in 11.43% cases, which is comparable with other studies. They found one case of lymphoma (25%) which was a 12.5 x 7.5 x 6.6 cms in the middle mediastinum. (NHL), 2 cases of TB Mediastinum (50%), and one case of metastasis (25%).

Adegboye VO et al<sup>6</sup>, in their study observed middle mediastinal involvement among 14 patients (13.3%).

In the study conducted by Senjuti Dasgupta et al<sup>9</sup>, 5 (22.7%) cases of lymphoma were diagnosed in the middle mediastinum, out of which 3 cases were found to be Hodgkin lymphoma and the other 2, non-Hodgkin lymphoma. These results are in accordance with those obtained by other authors. It has been reported that 50-70% of primary mediastinal lymphomas are Hodgkin type. Diffuse large B-cell lymphoma and acute lymphoblastic lymphoma are the common non-Hodgkin lymphomas found in the mediastinum.

In this study, we reported that the majority of the posterior mediastinal masses: Extramedullary hemopoiesis among 5 (41.66%) cases, Neural tumours among 4 (33.33%) cases, Paravertebral abscess among 2 (16.66%) cases and Tuberculous lymph node among 1 (8.33%) case.

Sergi Juanpere et al<sup>8</sup>, in their study reports that, Neurogenic tumours represent approximately 20% of all adults and 35% of all paediatric mediastinal tumours and they are the most common cause of a posterior mediastinal mass. Seventy to eighty percent of neurogenic tumours are benign, and nearly half are asymptomatic.

Akshatha Rao Aroret et al<sup>5</sup>, in their study observed that the incidence of tumours in the posterior mediastinum (8.57%) not as other studies, but less in comparison with other studies by Adegboye et al<sup>6</sup> (22.9%). This could be due to the lack of neurogenic tumours in our study.

In the present study, we compared various lesions in all the three mediastinum, based on CT scan, with its histopathological diagnoses. It was observed that Out of total 48 cases which were subjected for histopathological confirmation, CT diagnosed 46 cases as correctly, with two cases false negative. We found that the CT is 95.83% accurate in diagnosing mediastinal masses.

Suyash Kulkarni et al<sup>10</sup>, conducted a retrospective analysis of percutaneous CT-guided biopsies of mediastinal lesions. Out of 83 biopsies, distribution of results were primary neoplasm (n = 49), secondary neoplastic process (n = 28) and non-neoplastic conditions (n = 6). In our series, diagnostic accuracy for primary mediastinal neoplasm was found to be 93.8%; and secondary neoplastic process, 96.5%. High rate of neoplastic pathologies in our study is due to our being

a tertiary referral center for cancer. The diagnostic accuracy for non-neoplastic conditions was 100%. These results are in concordance with other studies.

Kato M et al<sup>11</sup>, in their study of 14 pathologically confirmed ganglioneuromas seen in 13 patients, 13 were evaluated by CT images with and without contrast, All lesions were identified as a well-demarcated oval and/or lobular mass. CT attenuation was predominantly low. Calcification on CT scan was seen in 38% of the cases. Whorled appearance (42%) and tailed-shaped edge (14%) were seen on both CT and MR images. Fat components (29%) observed histologically were also detected in tumors on CT and MR images.

In the present study, we assessed various neural tumours separately. We observed that out of total 4 neural tumours, 3 were neurofibroma (75%) while one was schwannoma (25%).

In the present study, we assessed various lymph nodal masses. Out of 27 total lymph node masses, majority of masses were of lymphoma (33.33%), followed by tuberculous lymphadenopathy (29.62%) and metastatic lymph nodes (33.33%).

Aram Baramet et al<sup>12</sup>, in their study observed that 6 patients had middle mediastinal lymphadenopathy and Lymphoma formed about 46% of middle mediastinal masses. Dutta P et al.<sup>13</sup> found that lymphomas were representing only 8% of mediastinal tumors from which 12% were anterior mediastinal masses and 14.3% middle mediastinal masses.

## CONCLUSION

Anterior mediastinal masses formed majority of the total masses 50.98% while posterior mediastinal masses and middle mediastinal masses comprised 23.52% and 25.49% of the total masses respectively. Anterior mediastinum comprised of Lymphoma (36.46%), Invasive thymoma (19.2%), thymoma (15.38%), Metastatic lymph nodes (11.53%), tuberculous lymph nodes (7.69%), sarcoma, malignant teratoma and metastasis. Metastatic lymph nodes (46.15%), tuberculous lymph nodes (38.46%). Other rare masses in middle mediastinum were bronchogenic cyst and lymphatic malformation. Extra medullary hemopoiesis (33.33%), neural tumours (33.33%), Paravertebral abscess (16.66%) and tuberculous lymph node (8.33%) were



the commonest lesions in the Posterior mediastinum. We found that the CT is 95.83% accurate in diagnosing mediastinal masses as compared to histopathological examination. Hence finally we conclude that the use of CT scan greatly expedites the diagnosis process.

**Conflicts of Interest:** None.

**Source of Funding:** KIMSDU

**Ethical Clearance:** Institutional Ethical Committee, KIMSDU

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# Knowledge, Attitude and Practice Among 13-15 Years Old School Children Towards Oral Hygiene

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## ABSTRACT

**Introduction:** Good oral health is essential for good nutrition and ultimately good general health. A set of healthy teeth is achieved by the practices, such as brushing, flossing, and periodic dental visit which should be developed early in the childhood. The study was aimed to assess the knowledge, attitude, and practice of 13-15 years old school children towards oral hygiene.

**Materials and Method:** School children (n=103) aged between 13 to 15 years in a private school were included into this study. The subjects completed a questionnaire that aimed to evaluate school children's knowledge, attitude and practice towards oral health and dental treatment.

**Results:** The results were tabulated and percentage was calculated. The individuals oral hygiene habits (such as tooth brushing , duration of brushing ) were found to be irregular and parents were the source of knowledge in the oral hygiene habits of their children. The study population showed awareness of caries and periodontal conditions. The children in this study also recognized the importance of oral health.

**Conclusion:** The children in this study recognized the importance of oral health. The results of this study indicate that Comprehensive oral health educational programs for children are required.

**Keywords:** Attitude, Knowledge, Oral hygiene , Practice, School children.

## INTRODUCTION

The most common dental diseases are dental caries and periodontal disease and can be prevented through good oral hygiene practices and reduction in sugar consumption amongst other measures. Good oral health is essential for good nutrition and ultimately good general health. A set of healthy teeth is essential for speech, appearance and normal development of the jaws.<sup>1,2,3,4</sup>

Promoting the oral health of adolescents through education in school has been prioritised by the World Health Organization (2008). Poor oral hygiene with increasing accumulation of plaque and calculus in the course of time has been reported among children and adolescents in both developed and developing countries.<sup>3,5,6,7</sup>

At the age of 12 years permanent teeth (except 3rd molars) would have erupted and by 15 years age these teeth are exposed to the oral environment for almost 3 years. WHO has recommends both these ages as the index ages for oral health assessment.<sup>3,7,8,9,10</sup>

We all know that lack of oral hygiene practices leads to development of oral diseases. These practices, such as brushing, flossing, and periodic dental visit should be developed early in the childhood. Dental flossing and tooth brushing are the most commonly performed oral self-care behaviour.<sup>5,11,13-16</sup>

Various literature data indicate that the most efficient and economically most cost-effective method of oral

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preventive program worldwide is the School Dental Care (SDC). It is particularly significant because schools may include those children who cannot come (due to socioeconomic reasons), do not want to come (because of fear) or who are not sufficiently motivated and interested in coming for regular checkups and dental repairs.<sup>6,17-19</sup>

The present study was done with the objective of assessing the knowledge, attitudes, and behavior of children. We intended to use this information for planning a school-based oral health program.

**MATERIALS AND METHOD**

The present study was an observational, descriptive, cross-sectional survey, conducted in children studying in private school. A convenience sample was selected and survey was done in 103 children under the age group of 13-15years.

**Inclusion and Exclusion:** School children (males & female) who have completed 13 to 15 years of age and present on the day of examination were included in the study. Children who refused to participate were excluded from the study.

Pre-tested structured questionnaire, comprising of multiple choice questions, was self-administered to assess their knowledge, attitude, and practices toward oral hygiene. Questionnaire consisted of 20 multiple choice questions which was divided into three parts.

The first part was to evaluate knowledge towards oral hygiene among children. The questions were related to how do they observe tooth decay, if they were aware that clean mouth can prevent tooth decay, where do they learn on oral health, etc.

The second part was to evaluate attitude towards oral hygiene among children. The questions were related to visits to dentist, importance of oral health, the expense of dental treatment, etc.

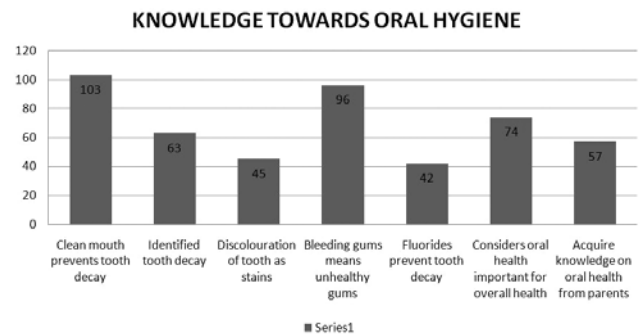
The third part was to evaluate practices towards oral hygiene among children. The questions were related to brushing techniques and duration, frequency of changing of toothbrush, etc.

The students received a full explanation on how to fill in the questionnaire. It was made sure that all the questions were attempted. On the basis of the responses received, the data obtained were statistically analysed. The total number and percentage were calculated and analysed.

**RESULT**

**Table 1: Knowledge towards oral hygiene among school children**

		Total & %
K1	clean mouth prevents tooth decay	
A	Yes	103; 100%
B	No	-
K2	brownish discolouration on/near the tooth?	
A	Calculus	34; 33.97%
B	Stains	45; 43.70%
C	Food particles	23; 22.33%
K3	How do you observe if there is tooth decay	
A	Pain	24; 23.30%
B	Bleeding gums	16; 15.53%
C	Black spot and hole in the tooth	63; 61.17%
K4	If there is bleeding from gums during brushing	
A	Unhealthy gums	96; 93.20%
B	Healthy gums	7; 6.80%
K5	Is oral health important for overall health?	
A	Yes	74; 71.84%
B	No	29; 28.16%
K6	where do you acquire knowledge on oral health	
A	Parents	57; 55.35%
B	School	6; 5.82%
C	Dentists	14; 13.59%
D	Friends/relatives	5; 4.85%
E	Media like TV, newspapers, internet	21; 20.39%



**Figure 1: Knowledge towards oral hygiene among schoolchildren**

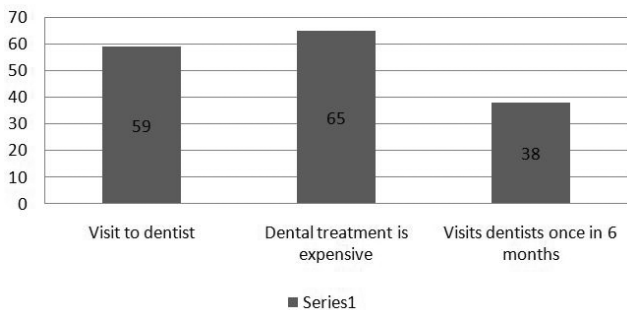
In this study, a total of 103 students filled the questionnaire consisting of 20 questions which was divided into three parts as knowledge, attitude and practice towards oral hygiene. In this section of survey (table 1) knowledge toward oral hygiene was measured. There were 7 questions about knowledge towards oral hygiene. All 103 children were aware that clean mouth prevent tooth decay. About 44% of the children

considered brownish discolouration as stains while 34% of the children considered as calculus and 22% considered as food particles. About 61% of the children said that tooth decay was observed as black spot and hole in the tooth while 16% of the children observed tooth decay as bleeding gums and 23% of the children observed as pain. About 41% of the children were aware that fluorides prevent tooth decay while 25% of the children were not aware and 34% of them said that fluorides does not prevent tooth decay. Around 72% of the children believe that oral health is important for overall health whereas 28% of them did not believe that oral health is important for overall health. (figure 1). Parents were the source of knowledge about oral hygiene among 55% of the children , dentists were the source for 14% , media for 20% whereas relatives for 5% and school for 6% of the children were the source of knowledge.

**Table 2: Attitude towards oral hygiene among schoolchildren**

		Total & %
A1	Previous dentist visit	
A	Yes	59; 57.28%
B	No	44; 42.72%
A2	Is cost of dental treatment is expensive?	
A	Yes	65; 63.11%
B	No	31; 30.09%
C	Don't know	7; 6.80%
A3	How often should you visit the dentist?	
A	Once in 3 months	40; 38.83%
B	Once in 6 months	38; 36.90%
C	Once in a year	25; 24.27%
A4	Why you should take care of teeth and gums	
A	For good looking	33; 32.04%
B	To prevent tooth decay	51; 49.51%
C	To prevent bad breathe	19; 18.45%

**ATTITUDE TOWARDS ORAL HYGIENE**



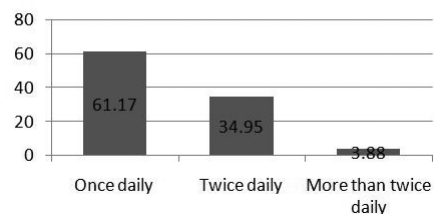
**Figure 2: Attitude towards oral health among schoolchildren**

In this section of survey ,(table 2) attitude toward oral hygiene was measured Around 59% of children had visited the dentist. Around 63% of the children said that cost of dental treatment is expensive while 30% of them said the cost is not expensive and 7% of them were not aware of the cost for dental treatment. Around 50% of the children thought that they should take care of teeth to prevent tooth decay whereas 32% of them thought for good looking and 18% of them thought to prevent bad breathe.[figure 2]

**Table 3: Practice towards oral hygiene among schoolchildren**

		Total & %
P1	How often do you brush your teeth ?	
A	Once daily	63; 61.17%
B	Twice daily	36; 34.95%
C	More than once daily	4; 3.88%
P2	how many minutes do you brush your teeth	
A	2-3mins	23; 22.33%
B	1-2mins	27; 26.21%
C	3-4mins	32; 31.07%
D	More than 4 mins	21; 20.39%
P3	How do you brush your teeth ?	
A	Vertical strokes	7; 6.79%
B	Horizontal strokes	31; 30.10%
C	Both a and b	57; 55.34%
D	Circular strokes	8; 7.77%
P4	When do you change your toothbrush	
A	Once in 3 months	20; 19.41%
B	Once in 6 months	45; 43.69%
C	When the bristles are spoilt	21; 20.39%
D	Don't know	17; 16.51%
P5	Do you use mouth wash	
A	Yes	35; 33.98%
B	No	68; 66.02%
P6	amount of tooth paste used	
A	Full length of the bristles	58; 56.31%
B	Pea sized amount	13; 12.62%
C	Half length of the bristles	32; 31.07%

**FREQUENCY OF BRUSHING**



**Figure 3: Frequency of brushing**

In this section of survey ,(table 3) practice toward oral hygiene was measured. Around 61% of the children brush their teeth once daily while 35% of them brush twice daily and 4% of them brush more than once daily. [figure 3]. About 46% of the children use tongue cleaner while 14% of them use dental floss and 42% were not aware about other oral hygiene aids. Almost 31% of the children brushed their teeth for 3-4mins whereas 26% of them brush their teeth for 1-2mins , 22% of them brush their teeth for 2-3 mins and 20% of them brush their teeth for more than 4 mins. Almost 55% of the children use both vertical and horizontal strokes for brushing while 30% of the children use horizontal strokes , 7% of them use vertical strokes and 8% of them use circular strokes for brushing.. Only 19% of them changed their brush once in 3 months and 17% of them were not aware how frequently they change their brush. About 56% of the children used toothpaste along full length of bristles whereas 31% of them used toothpaste along half length of the tooth paste and 13% of them used pea sized amount tooth paste. Around 54% of the children rinse their mouth at times after every meal while 34% of them rinsed their mouth every time after every meal and 12% of them never rinsed their mouth after every meal.

## DISCUSSION

This paper has focused on oral health knowledge and practices among school children in Chennai. The results showed that 35% brushed their teeth twice a day. A similar study conducted by Devishree.et.al<sup>16</sup> reported 41% student brush twice a day.

Most of the students brush their teeth in random direction (55%) along with a certain set of students using horizontal(30%) , vertical(7%) and circular (8%) brush strokes.

A perturbing result came out when students were asked about various questions on dental knowledge. Only 44% were able to answer that stains means brownish discolouration of tooth. The result obtained when asked about calculus, 34% of student were not aware that it means hard deposit on teeth. About 72% of students were aware that oral health is important for overall health. Around 41% of the student population only knowing that fluoride strengthens teeth, the rest having erroneous knowledge or being completely unaware. 100 % of the student population answered in the affirmative

that they are aware of the importance of oral hygiene and clean mouth prevents tooth decay. About 93% of the student population knew that gingival bleeding could be due to improper oral hygiene practices. These results implicate a acceptable awareness and knowledge of oral hygiene practices and the impact of it on oral health, thus, bringing the need of awareness initiative concerning oral health.

Some of the results that were brought out were that 46% use tongue cleaner and 34% use mouth wash on a regular basis, a large percentage of children indicate no use of tongue cleaner and mouth wash. This could be due to low socioeconomic status and lack of proper oral hygiene knowledge. It coincides with the results of another study done by prashanth et al 2011<sup>20</sup>.A majority of the student population were aware of the importance of oral hygiene practices exposing a contradiction in their knowledge component. Almost half of the student population brush for 3-4 minutes, change their tooth brush within the stipulated time, use medium tufted brush and rinse their mouth at times after every meal.

Many participants (41% )said that they don't visit dentist because they don't have any dental pain. The results also showed that a majority of group(63%) said the cost for dental treatment is expensive and about 50% students take care of their teeth in order to prevent tooth decay. The outcome also highlighted the importance of parental role and participation in oral hygiene practices.

## CONCLUSION

The children in this study recognized the importance of oral health. The results of this study indicate that Comprehensive oral health educational programs for children are required.

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**Conflict of Interest:** Authors report no conflict of interest of any kind.

**Statement of Informed consent:** Informed consent was obtained from the concerned authorities or parents of children before the study.

**Statement of Human and Animal Rights:** No harm was inflicted on any humans or animals on conduction of this study.

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# A Study on Awareness about Self Medication Practices among Working People in Kerala

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## ABSTRACT

The role and the importance of health care systems is well recognized in modern era both in terms of the quality of life and social welfare as well as every day individuals are practicing self-medication in the form of self-care for our health. Self-medication is a human behaviour in which, an individual uses medicines to treat self-diagnosed small or minor ailments. Prevalence of such practices is alarmingly high in developing countries like India. In India, any drugs not included in the list of 'prescription-only' drugs are considered as non-prescribed medicines or Over the Counter (OTC) drugs. Anyone can buy medicines for self-treatment from local medical shops, which are also available in supermarkets and other retail shops. Also such medicines include cough and cold remedies, sunscreens etc. The study mainly aims to find out the awareness of people in regarding the usage of OTC drugs and the factors affecting self-medication practices.

**Keywords:** *Self-medication, Over the Counter drugs, Non-prescribed drugs, Awareness.*

## INTRODUCTION

Good health is considered as one of the fundamental right of an individual. This shows the prominence of health care system in our society. The health issues around the world especially in developing and under developed countries are pathetic. The study of World Health Organization (WHO) reveals that the expenditure on healthcare is extremely high in India and creates a huge financial burden on individuals. In such a condition, Self-medication is widely accepted as a first line approach in most cases of minor ailments and OTC drugs are the most widely self-medicated element to treat minor and common ailments. Self-medication is otherwise called as non-prescribed medicines or OTC drugs.

The Indian pharmaceutical market is estimated to reach at \$55 billion by 2020 at a Compound Annual Growth Rate (CAGR) of 15.92% according to the report by India Brand Equity Foundation (IBEF 2018)<sup>[1]</sup> Now a day, every consumer goes for self-care products to help them to get through common minor health issues. This is because they find this practice of self-medication very convenient and easier as they don't want to wait for a long queue to meet the doctor in their busy scheduled life. Another important reason for adopting self-medication practice is that rise in the cost of health care services. Families, friends, pharmacists, previous experience, advertisement in newspapers and Television are some of the major source of information about self-medication<sup>[2]</sup>.

The practice of self-medication would be safe, if one uses it with sufficient knowledge such as its time of intake, dosage, side effects on overdose, duration of course, but lack of adequate information can cause serious effects such as antibiotics resistance, skin problems, allergy etc. Over dosage of painkillers can cause stomach bleeding, kidney problems. Professional estimates that about many people die after unintentionally taking too much of these medicines without knowing the correct dosage. When an individual takes self-medication or even prescribed medicines, certain foods, drugs, herbs,

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vitamins and one's own existing medical conditions will create a harmful reaction. The best way to avoid this is to have a potential interaction with a doctor or pharmacists. But the problem with this is that these days the OTC drugs are sold in grocery stores or in convenient stores. So always there will not be a knowledgeable person to guide an individual to take up the correct medicines.

**Statement of the problem:** Health is inevitable for everyone, now a day every individual is conscious about their health and their medication practices. In this busy world, no one has the time to meet the doctors or physicians for treating minor ailments, so most of the people prefer self-medication. Here the importance of self-medication arises. But whether they are taking the right medicine for their symptom is very important because some may have adverse effect. The study mainly focuses on the awareness level about self-medication practices and consumption of OTC drugs among working people in Kerala, because many of them may not be fully aware about the consequences of these non-prescribed drugs. So without proper knowledge sometimes the situation can become worse than better.

### OBJECTIVES

1. To know the awareness level of consumers in using over the counter medicines.
2. To study the factors affecting in consuming self-medication and the buying behavior of Consumers.
3. To suggest the possible recommendations for further improvements.

### RESEARCH METHODOLOGY

Descriptive study has been used for this study. The study is based on a survey of the respondents. For that 150 samples were selected and purposive sampling is the technique used. The data are collected through primary and secondary source. Structured questionnaire has been used for collecting primary data and these are analysed using Statistical Package for Social Sciences (SPSS), Frequency analysis, One-way ANOVA was used to measure the awareness level of consumers with that of their demographic factors such as age, gender, and locality. While secondary data consist of various journals, articles and information from websites.

**Hypothesis:** There exists no significant difference between demographic factors and awareness level of consumers.

### LITERATURE REVIEW

1. Over The Counter Drug Market in India: A Study to Understand the Current Regulatory perspective and industry dynamics-Suniel G Deshpande, Rajesh K Srivastava (2018)<sup>[3]</sup>. There has been a rise in the number of over the counter products introduced in healthcare market in India, the government is trying to give legal recognition to the OTC drugs which currently do not have any legal recognition. The parameters that are important determinants of a successful OTC treatment are safety of the drugs, clarity in the indication and administration of the drugs and easy availability. The factors driving the Indian OTC drug market are changing lifestyle, changing food habits, increasing literacy rates, prevalence of untreated common illness, high medical costs etc.
2. Consumer Selection and Buying Behavior Towards Over-the-counter (OTC) Medicine in Jaipur City-Abhishek Dadhich, Dr. Kavaldeep Dixit (2017)<sup>[4]</sup>. The study reveal that consumer in Jaipur city are aware regarding the use of OTC medicine for common ailments and there is responsibility of pharmaceutical companies, government to promote knowledge and awareness among consumer for safe and effective use of OTC medicine. T.V. advertisement and pharmacist are the major source of information regarding OTC products. The consumer considers brand names and symptoms for selecting the new OTC brand product so it is necessary for pharmaceutical companies to work intensively on brand building as well as the advertisement should comprise of information about symptoms and indication for which OTC medicine were used.
3. Perception of pharmacists regarding over-the-counter medication: A survey-Abhinaya Ravichandran, Asha Basvareddy (2016) <sup>[5]</sup>. The study found that all of the pharmacists had dispensed OTC medications. It also found that Analgesics and antipyretics, drugs for gastritis and anti-diarrheal agents were the most commonly bought OTC drugs. Most of the pharmacists specified that the consumers have brand preference towards the OTC drugs that they buy. It is also found out that sometimes, the consumers disclose the complaints to the pharmacist who then



decides the suitable OTC medication. However, consulting doctor before taking medications was recommended by many of the pharmacists.

4. Evaluation of Knowledge, Attitude and Practice about Self-medication among Rural and Urban North Indian Population-Akram Ahmad, Muhammad Umair Khan (2015)<sup>[6]</sup>. The study aims to find out the self-medication practices, knowledge and the factors affecting self-medication practices in the rural and urban population. The study shows that the awareness regarding non-prescribed drug are significantly more in urban population than in rural people and it also states that there is a need to promote educational campaigns to bridge the gap of knowledge mainly among rural people.

5. A Study on the Dispensing Pattern of Over the Counter Drugs in Retail Pharmacies in Sarjapur Area, East Bangalore-Manjushree Nagaraj, Ananya Chakraborty, and B.N Srinivas (2015)<sup>[7]</sup>. The study reveals that the most commonly dispensed OTC drugs were analgesics also the patients were not aware of the side effects. The study concluded that more awareness to patients as well as pharmacists regarding OTC drugs have to be provided in order to reduce harmful effects of such medicines, and this can be done through with the help of mass media and by proper training for pharmacists. The study also states that the concerned authorities should enforce laws pertaining to the dispensing pattern of these OTC drugs.

### ANALYSIS AND INTERPRETATION

#### 1. One-way ANOVA

**Table 1: One Way Analysis of variance- Age of the Respondents**

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	.910	4	.227	.849	.496
Within Groups	39.117	146	.268		
Total	40.027	150			

Source: Direct Survey

**Interpretation:** The result of the above Table 1 reveals that the F value is (0.849) is not significant at (p<0.05). So we accept the null hypothesis and reject alternative hypothesis. So in a nutshell there is no significance difference in the awareness level regarding OTC medication and age of the respondents.

**Table 2: One Way Analysis of variance-Gender of the Respondents**

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	.007	1	.007	.025	.875
Within Groups	40.020	149	.269		
Total	40.027	150			

Source: Direct Survey

**Interpretation:** The result of the above Table 2 reveals that the F value is (0.025) is not significant at (p<0.05). So we accept the null hypothesis and reject alternative hypothesis. So in a nutshell there is no significant difference in the awareness level regarding OTC medication and age of the respondents.

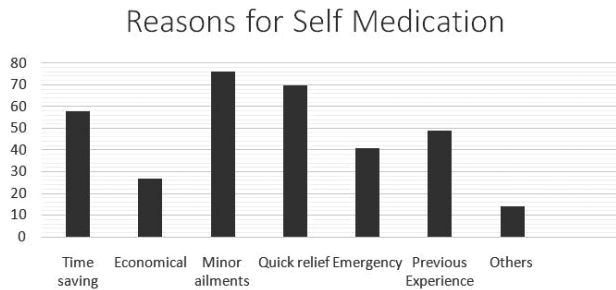
**Table 3: One Way Analysis of variance-Locality of the Respondents**

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1.753	2	.876	3.389	.036
Within Groups	38.274	148	.259		
Total	40.027	150			

Source: Direct Survey

**Interpretation:** The above Table 3 indicates that the f value is (3.389) is significant at ( $p < 0.05$ ). So we reject the null hypothesis and accept the alternative hypothesis. In a nutshell there is significant difference in the awareness level with that of the locality of the respondents

## 2. Reasons for Self-Medication



**Figure 1: Reasons for self-medication**

**Interpretation:** The above Figure (8.1) represents the reasons for the practice of self-medication, and it is clear that the major factor/reasons which contribute to prefer self-medication are minor ailments, followed by quick relief, time saving and previous experience in using OTC drugs.

## FINDINGS

- From the study it was found that most of the users of OTC drugs belongs to the age group of 21-30(46.7%) followed by 51-70(27.3%).
- Most of the respondents prefer self-medication (45.3%) followed by doctor’s advice (43.3%) for minor ailments.
- Majority of the respondents buy OTC drugs from medical shops or pharmacies.
- Major reasons for adapting self-medication are minor ailments quick relief and time constraints.
- Most preferred source of information regarding OTC drugs are from Pharmacist.
- Cold and cough, fever, headaches are the common types of ailments for which OTC drugs are used and rubs/balms, painkillers were the mostly used OTC drugs.
- Majority of respondents inquire to the pharmacist for more information regarding the OTC drugs and about its usages.
- Most respondents insist on same brand of OTC they use and the reason for that is quality of the brand, effectiveness and brand familiarity

- Majority of the respondents are of the opinion that usage of OTC drugs has reduced their overall medical expenditure.

## SUGGESTIONS

- Proper awareness and education should be given to consumers regarding self-medication, especially for people in rural areas as they don’t have much access to such information.
- Dispensing modes have to be improved through strict regulations.
- Proper education to pharmacists must be provided because, sometimes they fail to give the appropriate use of prescribed medication
- Poor prescribing practice from the part of physicians must be taken into consideration as many of the times they may not mention the frequency of dosage, duration period of the medicine to be taken and sometimes physicians prescribe medicines which are of high cost that may not affordable to every patient.
- Pharmaceutical companies should provide information to the consumers with regards to the adverse effect of OTC drugs due to continues usage.
- Many of the consumers prefer OTC medicine for minor ailments as the price of such medicines are considered to be low, but the long term consequences of having such medicines are unknown to many. So the usage of medicines like paracetamol, aspirin etc. should be taken cautiously.
- Government should take necessary steps to prevent the abuse use of OTC drugs.

## CONCLUSION

Even though there are many legal restrictions in supply of OTC drugs the quantum of sale is comparatively higher [3]. The study found out that there is no significant difference in the awareness level of OTC drugs with that of the age, gender, occupation, monthly income of the respondents, but there is a significant difference in the awareness level with that of the locality of the respondents. From this it can be understood that the people living in urban and semi urban areas have more awareness about the self-medication practice when compared with people living in rural areas. So proper measures have to be

taken from the side of the regulatory authorities in order to bridge this gap. The survey also found out that even though self-medication is widely accepted for treating minor ailments, professionally qualified as well as self-employed people mostly prefer doctor's advice rather than self-medication, the study also reveals that people having high income category prefer self-medication for treating minor ailments. A number of factors were found that influenced the respondents to use OTC drugs are lack of time and money and many of the respondents were of the opinion that for minor ailments self-medication as a good option and provides them quick relief. Other factors contributing to the prevalence of self-medication is that patients uses old prescription as well as consumers request specific medicines directly from pharmacist. The major sources of information regarding OTC drugs are from pharmacist and friends and family. Even though the there are many positive factors which drive towards the use of OTC drugs, there are many consequences for the same. So proper knowledge should be given to the consumers regarding the usage of these OTC drugs such as their dosage, side effects etc. Also Government should take necessary actions to prevent the misuse of these OTC drugs by forming strict regulatory framework.

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**Conflict of Interest:** Nil

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# Salivary Cortisol Level; Its Role in Stress Induced in Patients Undergoing Dental Treatment; An in Vivo Study

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## ABSTRACT

**Aims and objective:** The stress control is essential in patients to elude the loss of motivation for Dental procedures. The present study was conducted to estimate salivary cortisol response to stress developed in patients undergoing Dental treatment

**Methodology:** The salivary cortisol level were evaluated in 40 patients ,out of which 10 patients were healthy patient who do not require any dental treatment and 40 patients were the study group who underwent scaling,implant treatment and class 1 cavity preparation for restoration .The groups demarcated were as follows.

Group 1: control group with no treatment and just the saliva sample was taken.

Group 2: The patients undergone scaling

Group 3: The patients undergone implant treatment

Group 4: The patients undergone class 1 cavity preparation for restoration.

The salivary cortisol levels were evaluated using Salivary Cortisol Enzyme Immunoassay Kit.

**Results:** The salivary cortisol level was highest in Group 3, followed by Group 2 ,Group 4 and least in Group 1.

**Conclusion:** The stress level was lowest in healthy patient and highest when patient underwent implant placement in appointment.

**Keywords:** Anxiety, Dental Treatment, Salivary Cortisol Enzyme Immunoassay Kit, Salivary Cortisol Level

## INTRODUCTION

The assessment of patient stress is essential to evenly execute Dental procedures. **Buchanan T W, Preston SD**<sup>1</sup>. reported that the stress responses are not invariably hostile. The stress control is necessary in patients to escape the loss of motivation for dental treatment . The stress disturbances are the common mental disturbances.<sup>2</sup>**Ohura K, Nozaki**

**T, Shinohara M, Daito K, Sonomoto M, Daito M, Kiyono**<sup>3</sup> stated that By lowering stress of Dental procedures ,the patients adjustability improves and motivate them to get their Dental treatment done .<sup>4</sup>The extended stress reaction may develops cortisol dysfunction and immense pain. <sup>5</sup> It may results in change in behavior in children and affects the Dental treatment . As collection of Saliva is not invasive and not harmful, therefore it can be used as a specimen for stress-related substance measurement and is easily collected with minimum efforts than blood sampling. Stress-connected substances present in saliva are chromogranin A (CgA), secretory immunoglobulin A (sIgA) , and salivary amylase, catecholamine and cortisol<sup>6,7</sup>,

There is marked contrast in patients reaction to stress in children who are involved not only in a agony

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procedure but also a painless treatment . Anxiety develops due to restless tense feeling while in dental chair during the treatment procedure. The outcome with administration of anesthesia and with agony procedures are unavoidable. Dental outlook can be initiator of stress for young patients. Exposure treatment strategy should be followed for phobic anxiety. The raised stress levels should be inscribed in clinical training. <sup>8</sup>Painfull situation generally develops due to the stressful situation. <sup>9</sup>Therefore the anxiety strand is more in patients undergoing dental treatment and this pressure differ in the further visits that persue to depend upon to what they are open to, during these visits.Pain rehabilitation is not dissertated but there is connection between stress and pain .Therefore the present study was conducted to estimate salivary cortisol response to stress developed in patients undergoing Dental treatment

**AIMS AND OBJECTIVES**

1. To estimate salivary cortisol level in healthy patient and in patient after doing scaling
2. To estimate salinary cortisol level in patient undergoing implant treatment
3. To estimate salivary cortisol level in patient after doing class 1 cavity preparation for restoration tooth preparation.
4. To comparatively estimate salivary cortisol level in patients undergoing Dental treatment.

**MATERIAL AND METHODOLOGY**

There were 50 participants (10 control and 40 study group patients) who participated in the present study. The sample size was chosen using the previous studies done Greabu M Purice M, Totan A, Spinu T, Totan C <sup>10</sup> the sample size was calculated to be 40 per group keeping a confidence interval of 95% and a power of atleast 80%. All associated subjects were being asked to provide correct medical and dental history. Fifty patients age group ranging 20-25 were included in the present study. The motive of the study was prior notified to the patients requesting them for collection of saliva sample. These patients underwent Dental procedure. They were divided into 4 groups

**Group 1:** control group with no treatment and just the saliva sample was taken.

**Group 2:** The patients undergone scaling

**Group 3:** The patients undergone implant treatment

**Group 4:** The patients undergone class 1cavity preparation for restoration.

The saliva was taken 5 minutes before patients sat on Dental chair for group 1 subjects, however for group 2,group 3 and group 4 subjects ,saliva was taken 10 minutes after commencement of Dental procedures . Each of the subject was informed to collect saliva samples in polypropylene vials and placed in freezer .Around 1.0 ml of non revivifying saliva was collected in a sterile tube and frozen latter at 20 degree centigrade for further study. The salivary cortisol levels were evaluated using Salivary Cortisol Enzyme Immunoassay Kit ( Salimetric <sup>TM</sup>. LLC State college PA ,USA) <sup>9</sup>The software used for the statistical analysis were SPSS (statistical package for social sciences)

**Statistical Analysis:** The statistical analysis were done using **Kruskal-wallis test and Mann-whitney U test.** P-value < 0.05 is considered as significant.

**RESULTS**

**Table 1: Comparative mean salivary cortisol level (ng/ml) for group 1,group 2, group 3 and group 4**

Groups	Cortisol level		F-value	p-value
	Mean	S. D.		
Group 1	9.51	3.07	50.908	< 0.001* <sup>a</sup>
Group 2	24.63	8.69		
Group 3	31.40	10.05		
Group 4	15.62	7.99		
Group 1 vs Group 2 <sup>b</sup>				0.001*
Group 1 vs Group 3 <sup>b</sup>				< 0.001*
Group 1 vs Group 4 <sup>b</sup>				0.038*
Group 2 vs Group 3 <sup>b</sup>				0.045*
Group 2 vs Group 4 <sup>b</sup>				0.020*
Group 3 vs Group 4 <sup>b</sup>				< 0.001*

<sup>a</sup>Kruskal-wallis test

<sup>b</sup>Mann-whitney U test

\*Significant difference

The mean cortisol level was compared among the different groups using the **Kruskal-wallis test**. There was a significant difference in mean cortisol level between the different groups. The mean cortisol level was significantly more among group 3 in comparison to groups 1, 2 and 4. The mean cortisol level was significantly more among group 2 in comparison to group 4 which was significantly more in comparison to group 1. The mean cortisol level was significantly more among groups 2, 3 and 4 in comparison to group 1. The mean cortisol level was highest in group 3 followed by group 2, group 4 and lowest in group 1 (Table 1 and Graph 1)

## DISCUSSION

The cortisone prepares the body for fear or frightening conditions and situations by production of glucose, providing an immediate energy source to large muscles. The cortisol inhibits insulin production in a purpose to halt or terminate glucose from being stored for immediate release<sup>11</sup>. The stress exherbation can develop diminished PNS tone, which further increases patients attentional reactions to stressors. It can result in alterations in autonomic nervous systems elevating patients vulnerability to stress.<sup>12</sup>

The cortisol nourishes and recalls the frightening participation of Dental treatment. **Drexler SM, Merz CJ, TanjaC, Hamacher –Dang, Tengentoff M, Oliver T in 2015**<sup>13</sup>, stated that there is persistence of powerfull touching revoke happening in fear and post traumatic pressure therapy. **Lai JCL** in 2014<sup>14</sup> reported that it is not always that aging helps in adjustment of stress hormone cortisol during psychosocial disturbance. There is lesser hopefulness, anxiety, mental disorder, depression with severe pressure, distress multiplied with raised cortisol level. The cortisol is produced in response to anxiety, pressure or stress by adrenal gland. The cortisol is also liberated in conditions like getting up early morning, exertion and acute pressure or tension. Dental anxiety, fear, stress results in negligence of proper Dental treatment care. This is the most common problem in Dental office.<sup>15, 16, 17</sup>

The present study was conducted to estimate salivary cortisol response to stress induced during dental treatment procedures. There was significant difference in cortisol level in control group compared to

all study groups {group 2, group 3 and group 4}. The salivary cortisol level was highest in Group 3 (subjects with implant placement [ **31.40ng/ml**]), followed by Group 2 (subjects with scaling [ **24.63ng/ml**]), Group 4 (subjects with class 1 cavity preparation for restoration [ **16.62ng/ml**]) and least in Group 1 (control [ **9.51ng/ml**]). These results are similar to studies done by **Padmanabhan V, Rai K, Hedge AM**<sup>8</sup>. The study group (group 2, group 3 and group 4) opened to dental treatment develops in an elevation of salivary cortisol in contrast to control group with no treatment wherein just the saliva sample was taken. Dental treatment raises tension and uneasiness level which further elevates salivary cortisol. Among the study groups {group 2, group 3 and group 4}, group 3 (subjects with implant treatment [ **31.40ng/ml**]) produced highest cortisol level. The mean cortisol level was more in group 3 (subjects with implant treatment [ **31.40 ng/ml**]) compared to Group 2 (subjects with scaling [ **24.63ng/ml**]). The probable reason may be that the local anesthesia administered for implant placement elevated the anxiety level more in these patients which further elevated in mean cortisol level more in comparison to subjects with scaling procedure. Among the study groups {group 2, group 3 and group 4}, group 4 (subjects with class 1 cavity preparation for restoration [ **16.62ng/ml**]) produced lowest cortisol level. Group 2 (subjects with scaling [ **24.63ng/ml**]) produced higher cortisol level compared to Group 4 (subject class 1 cavity preparation for restoration [ **16.62ng/ml**]). The probable reason may be that the patient saw bleeding during the scaling procedure which elevated stress level in these subject resulting with raised cortisol level. The mean cortisol level was more in Group 4 (subject class 1 cavity preparation for restoration [ **16.62ng/ml**]) compared to **Group 1: control group with no treatment [9.51ng/ml]**. The probable reason may be that the sound of airrotor elevates stress level in these subject resulting with raised cortisol level

## Interpretation and Conclusion

1. The mean cortisol level was highest when patient underwent implant placement followed by patients who had undergone scaling and thereafter in patients with class 1 cavity preparation for restoration and lowest in healthy patients (control group)
2. The salivary cortisol is suitable indicator of stress detector.

**Strength of the study:** Salivary cortisol was used as a diagnostic aid to check stress levels in Dental patients. As collection of Saliva is not invasive and not harmful, therefore it can be used as a specimen for stress-related substance measurement and is easily collected with minimum efforts than blood sampling. The cortisol saliva does not attach to corticosteroid binding globin as it happens in the blood

**Limitations of the study:** The salivary cortisol level test was not done at particular time so prejudice can be there due to the day-to-day variation.

**Ethical Clearance:** Taken from Institutional Ethical committee

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Health Care Services by Primary Health Centres in Uthamapalayam Taluk in Theni District of Tamil Nadu- An Economic Analysis

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## ABSTRACT

Health is an important constituent of well-being and foundation for prosperity and development of a country human resources development in the form health has been instrumental in accelerating economic growth human health is accelerating economic growth human health is considered as a pre-requisite for optimum socio-Economic development health care has been accepted as the right of every individual in a country. Today knowledge and understanding of health are growing rapidly the accelerated technological regulation in multiplying the potential for improving health and transforming health literacy in to a better educated and modernizing global society people in the developing countries expect their government to but in to place as array of public policies to deal with health challenges. The role of health care in economic development has received increasing mention in recent years. There is a general agreement that economic growth is not rely a function of incremental capital output ratio. Investment in man need allocation for education, imparting skills and health care plays a significant role in fostering economic growth. Health is a state of completion physical mental and social well-being and not merely the absence of disease or infirmity the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without of rare religion political belief economic or social conditions.

**Keywords:** Human Resources Development, Health Care, Crude Birth Rate, Crude Death Rate, Infant Mortality Rate.

## INTRODUCTION

Health is an important constituent of well-being and foundation for prosperity and development of a country human resources development in the form health has been instrumental in accelerating economic growth human health is accelerating economic growth human health is considered as a pre-requisite for optimum socio-Economic development health care has been accepted as the right of every individual in a country. <sup>1</sup>Today knowledge and understanding of health are growing rapidly the accelerated technological regulation in multiplying the potential for improving health and transforming health literacy in to a better educated and modernizing global society people in the developing countries expect their government to but in to place as array of public policies to deal with health challenges. Moving towards health for all requires that health systems respond to the challenges of a changing

world and growing expectations too better performance this involves substantial re orientation and reforms to the ways health systems operate in society today those reforms constitute the agenda of the renewal of primary health center [PHC].

<sup>2</sup>Health is a state of completion physical mental and social well-being and not merely the absence of disease or infirmity the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without of rare religion political belief economic or social conditions. Government have a responsibility for the health of their people which can be fulfilled only by the provision of adequate health and social measures economics of health as a branch which is relatively recent. Origin in the disciplines of economics health issues to be studied as conceptual research issues and empirical research issues similarly health issues can be studied with a micro perspective both perspectives would have



a significant bearing on policy making. <sup>3</sup>Goods health is an important contribution to productive and Economic growth the essential three basic amenities for human being are rate house nutritional food and dress these make a man healthier the healthy human both mentally and physically gives the productivity to the economy the productivity of all individual depends greatly on his or health status of a nation population will contribute greatly to rewards achieving its development goal.

The role of health care in economic development has received increasing mention in recent years. <sup>4</sup>There is a general agreement that economic growth is not rely a function of incremental capital output ratio. Investment in man need allocation for education, imparting skills and health care plays a significant role in fostering economic growth.

### OBJECTIVES OF THE STUDY

1. To identify merits and demerits of the PHC Centers.
2. To offer Suggestions for better health care provisions.

**Statement of the Problem:** The present research work is to analyze the healthcare services of people in Tamilnadu state in general and in Theni district in Uthamapalayam particular with existing healthcare system and health services available to people in this region study groups on measurement of levels of health had listed various indications to measure the levels of health. <sup>5</sup>The comprehensive indicators are crude birth rate crude death rate infant mortality rate and expectation of life the specific indicators are death from communicable diseases indicators of health services and activities so in the present study the healthcare services of the state and district has been examined by Considering the movement of indicators of healthcare services and some of the determinates of these indicators. The present study also aims at finding the gap between the demand for health care services and supply of health care services at the level of primary health center [PHC] in Theni district uthamapalayam taluk.

### REVIEW OF LITERATURE

**Brijshesh** et al in their analysis on utilization of health services in India had used the reports of national sample

survey organization (NSSO)1992 and national council of appealed economic research (NCAER) 1992 the authors had studied utilization of health service at micro level tacking I to account the following aspects distance facility available cost and quality of care service under various systems like (ALL-OPATIC) Homeopathic, Ayurvedic and Unani he authors drew the following inference the NSSO and NCAER surveys.

**Amartyasen** in his working paper on the likeges among objectivity health and policy disclosed the fact that very nation had the responsibility to scrutinize its healthy policy issue he lillustated the status with different health status such as Kerala, Bihar, Utharspradesh he emphasized the role of literacy level in bringing down the prevalence of illness rate the all so pointed out that gender inequity was also one of the reasons for poor health status of women.

**Susha attempted** to study the health infrastructure of Kerala the author also examined the pattern of health expenditure in Kerala especially in the free system of medicine for similar disease she made a comparison among the three system of medicine namely allopathic, Ayurvedic and homeopathy while studying he health of the people in Kerala. She found that Kerala had already reached the goal of world health organization namely health for all by 2000 AD though Kerala ranked first in the health services among the all states in India the morbidity rate in Kerala was high this was due to mainly increase in longevity of the people which in turn resulted in increase in morbidity level the low per capita income in Kerala was also being the other reason for high level morbidity.

### METHODOLOGY

The methodology part deals with the research techniques and method applied in collection and analysis of data so that researcher can use their procedure to complete the study successfully.

**Sources of Data:** The present study is based on both primary and secondary data. Primary data were collected by using the interview schedule convenience sampling method is used to select 50 respondents for the collections of data. The collections of data is tabulated and presented for analysis and interpretation. Secondary data were collected from journals magazines Newspaper and unpublished these it etc. and of were government hospital office at Uthamapalayam taluak.

**Tools:** Percentage analysis is used for the analysis of the data.

### ANALYSIS AND INTERPRETATION

In this section, the data collected with the help of research methodology was classified, tabulated and treated with scientific methods to get the result after tabulation the results were interpreted to bring out the most sticking relationship between the variable the results have been presented with the help of table and figures, findings are presented.

**Table 1: Health Expenditure of Respondents**

S. No.	Monthly Expenditure (in `)	No. of Respondents	Percentage
1.	1000-1500	35	70
2.	1501-2000	5	10
3.	2001-3000	10	20
	Total	50	100

**Sources:** Primary Data

The above table shows that a majority of respondents (70%) spend from `1000 to `1500.

**Merits and Demerits of the PHC Centers:** In order to identify the merits and demerits of Primary Health Care Centers. The respondents were ranked the following merits and demerits. The respondents were list of various merits and demerits in the study area. They comprise the seven merits and eight demerits.

**Table 2: Merits of The Primary Health Centers**

S. No.	Particulars	Rank	Number of respondents	Percentage
1.	Free Treatment	I	48	96
2.	Free Drugs	II	42	84
3.	Devotion to Patients	III	24	48
4.	Qualitative Health Care	IV	30	60
5.	Less Waiting Time	V	14	28
6.	Proximity	VI	34	68
7.	Less Transport Cost	VII	38	76

**Source:** Primary Data

This table reveals that 96% of the respondents are ranked to free treatment and as followed to rank Free Drugs, Devotion to Patients, Qualitative Health Care, Less Waiting Time, Proximity, Less Transport Cost respectively.

**Table 3: Demerits of the Primary Health Centers**

S. No.	Particulars	Rank	Number of respondents	Percentage
1.	No Functioning on the evening time	I	46	92
2.	Insufficient Drugs	II	42	84
3.	No Facility in Labour Room	III	22	44
4.	Less Building Facility	IV	28	56
5.	No Emergency Ward	V	36	72
6.	Mostly referral to Government Hospital	VI	26	52
7.	No X-ray Infrastructure	VII	18	36
8.	No Mobile Hospital	VIII	12	24

**Source:** Primary Data

The above table reveals that 92% of the respondents are ranked No functioning and evening time and as followed to rank. Insufficient Drugs, No Facility in Labour Room, Less Building Facility, No Emergency Ward, Mostly referral to Government Hospital, No X-ray Infrastructure and No Mobile Hospital respectively.

### FINDINGS

People utilizing Main PHCs are relatively educated much better than users of Additional PHCs. Main PHCs are easily accessible whereas some of the Additional PHCs are situated in interior places. Some main PHCs respondents told that they have to go to the nearest District Headquarters hospital. Some of the respondents expressed that same medicine supplied by PHCs for various types of illness.

So, the government has to supply new medicines to people. For TB patient they give perfect treatment. If the patient forgets to buy the medicine the PHC staff visits to their homes and gives treatment. Especially for AIDS identification PHC plays a vital role. Many respondents explained that PHCs are not functioning in the evening

and non-availability of sufficient drugs. Many Medical Officers of PHCs resided in urban area; in such cases, respondents want doctors to stay in the PHC quarters. Morbidity level is high among users of main PHCs for both male and female adults and male child.

In both Main PHCs and additional PHCs users, morbidity is high among the female. Compare with male child and female child the percentage of morbidity was high among female child both in main PHCs and additional PHCs areas. The respondents demand that along with curative and preventive health care services, they want promotive services like appointing psychologists and physiotherapists in Main PHCs because mental health is one of the important problems in recent years. Now-a-days the number of accidents is increasing in both rural and urban areas. Therefore, services of orthopedic specialists and physiotherapists to be provided in PHCs.

**Suggestions and Policy Implications:** The government has to adopt health monitoring scheme for elderly population, due to increasing Life Expectation at Birth. Elderly population are severely affected by sudden changes in the climatic conditions. The illiterate population are not interested to make use of the health services when they are sick. Therefore, they are acting as agents for communicable disease like viral fever, malaria, etc.

Hence, the government should create awareness about the significance of preventive health care in rural areas and urban areas in addition with or curative services. Introducing, encouraging and enhancing the research and development on clinical research towards the community and field-oriented health care services to be done instead of institutional oriented health care services.

### CONCLUSION

There is high scope to introduce positive measures for further enhancement of survival rate in Theni District as well as in Uthamapalayam Taluk region. To enhance the health status in micro or macro level, policy makers and

health planners will have to focus on action programmes to intensify the health services to reach the doorsteps of the poor community. It is necessary to educate the poor socio-economic group regarding the utilization of health services, proper housing and sanitation.

Employing medical personnel and paramedical personnel in required area particularly main PHCs and additional PHCs will be a fruitful measure according to this study. Hence the researcher concluded from this result obtained in secondary and primary sources that, any positive measures to improve the medical infrastructure in Main PHCs and Additional PHCs in the coming years in Theni District and Uthamapalayam Taluk will enhance primary health centers of the people.

**Ethical Clearance:** Completed

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# School Teacher's Knowledge, Attitude and Practices Regarding Oral Health in Ballabgarh Block, Faridabad

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## ABSTRACT

**Background:** School teachers have an important role in oral health promotion and improvement of oral health in school children. Positive attitude, knowledge and practices in school teachers are, therefore important. The present study aims at assessing oral health related knowledge, attitude and practices of school teachers in Ballabgarh, India.

**Method:** A cross sectional survey of school teachers was conducted among school teachers of Ballabgarh urban area. A 20-item close-ended questionnaire to assess oral health related knowledge, attitude and practices were administered to those who consented to participate. The data was assessed in SPSS Version 21 for means, frequency, distribution and descriptive statistics.

**Results:** The total number of participants was 294 (91.8%) with the mean age of 28 - 45 years. It was found in the present study that 55.44% of the participants had visited the dentist in the past one year. Majority of teachers had correct knowledge of oral cleaning aids, however a large number of participants had inadequate knowledge about causes and prevention of gum disease.

**Conclusion:** School teachers should be trained in this work and they should further educate the parents as well as the school going children about the oral health. Their knowledge should be assessed regularly and further changes in the program should be done in the school oral health program.

**Keywords:** Oral health, Knowledge, attitude, school teachers

## INTRODUCTION

Globally it has been seen that the burden of oral diseases is considerable. Oral disease can lead to pain and tooth loss, a condition that affects the appearance, quality of life, nutritional intake and, consequently, the growth and development of children. Tooth decay and gum disease are among the most widespread conditions in human populations, affecting over 80% of schoolchildren in some countries<sup>1, 2, 3</sup>. In order to reduce the oral diseases in school children, it is required to provide the oral health knowledge at infant and preschool level. The importance of imparting lessons on hygiene

to infants and pre-school children had been recognized as early as 1878<sup>4, 5</sup>. Children spend considerable time in school especially during the age when their habits are being formed<sup>6</sup>.

School is also considered as the ideal sites for imparting oral health education, and conducting preventive programs to reduce burden of these diseases as services can be made available to all children, including those who, for a variety of reasons, may not be receiving professional care<sup>7</sup>. The need for the promotion of oral health in schools is evident and it can easily be integrated into general health promotion, school curriculum and activities. Healthy behaviors and lifestyles developed at a young age are more sustainable. Messages can be reinforced throughout the school years<sup>8, 9</sup>.

Shaping ways of life and personality development of school children during elementary education is the key responsibility of school teachers and parents<sup>10</sup>. School teachers are role models for their student and the role

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of teachers during these development stages of the child critical<sup>6</sup> as they can educate the children about how to prevent oral diseases and promote oral health. They shape the future of the students and they are the one, who are entrusted with the role of carrying out various preventive services and delivering education on oral health in the long run<sup>11,12</sup>. It has been seen that teachers are more skilled in educational psychology than dentist<sup>13</sup>. Schoolteachers are often asked to conduct oral health education and to administer preventive services also<sup>7</sup>.

Hence, given the continuing, important role of teachers in school oral health programs and in the habits and lifestyle behavior of school children, the objectives of this study were: to assess the oral health knowledge, attitudes, and practices of school teachers

## MATERIAL AND METHOD

A cross sectional study was conducted in schools from urban area of Ballabgarh block, Faridabad district from August-September 2018. Ethical clearance was obtained from the institutional committee for conducting the study. Permission for conducting the study was obtained from the concerned school authorities. A close ended questionnaire was administered to find the level of knowledge of oral health and their determinants like educational qualification and years of experience. The questionnaire included 20 questions and was adopted from the previous studies<sup>6,10</sup>.

Ballabgarh block of Faridabad district has 14 schools in urban area<sup>14</sup>. All the school teachers working in these schools and present on the days of data collection were included in the study. 4 schools did not give the permission for the data collection. A total of 320 school teachers were working in the remaining schools. Participation was voluntarily. The overall complete questionnaires collected at the end of the study were 294. The response rate found in the present study was 91.8%. Two dental professionals evaluated the prepared questionnaire to maintain its face and content validity. This questionnaire was then pretested

on 20 school teachers and required changes were made in the questionnaire.

The questionnaire measured demographic details, knowledge, attitude and practices of school teachers regarding oral health and dental treatment. The knowledge questions assessed tooth cleaning medium, tooth cleaning materials, causes of decay and its prevention, any accessory tooth cleaning aid, frequency of tooth brushing, causes and prevention of gum diseases.

Attitude was assessed using questions regarding visiting dentist, parent's restriction on snacks, fluoride protection and inspection of lunch boxes by teachers. Further, the practices were assessed using questions on brushing activity (frequency of brushing, brush changing frequency) and visiting dentist. After consent, participants were explained regarding purpose of the survey. The questionnaire was self-administered and one of the authors stood by the participant to answer any query. On an average, it took 10 - 12 minutes to the participant to complete the questionnaire. Data was compiled and analyzed using SPSS version 21 (IBM Chicago). Descriptive statistics were obtained and means and frequency distribution were calculated

## RESULTS

The total number of participants in the present study was 294 with the mean age of 28 - 45 years. Male subjects were 60 (20.41%) and female were 234 (79.59%). Majority of the participants were graduates i.e. 62.58% and 71.42% were married. It was found in the present study that 55.44% of the participants had visited the dentist in the past one year and the most frequent reason for visiting the dentist was routine dental checkup (40.47%). Further it was also observed that majority of school teachers were brushing twice daily (56.80%) and few were brushing even thrice and more (16.32%). Most of the study participants were changing the tooth brush in every three months i.e. 41.49%. Table 1 is showing attitude of the study participants regarding oral health.

**Table 1: Attitude of school teachers regarding oral health**

	Yes	No
School teachers should inspect lunch boxes	206 (70.06%)	88 (29.93%)
Fluoride protection against decay is required	193 (68.64%)	101 (34.35%)
Regular checkup by dentist is necessary	201 (68.3%)	93 (31.63%)
Parents should restrict consumption of sweet and sticky snacks	185 (62.92%)	109 (37.07)
Children less than 10 years need help while brushing	223 (75.85%)	71(24.14%)

## DISCUSSION

Assessing the knowledge, attitude and practices for oral health among school teacher is important as they have the most critical role to play in the behavioral practices of school students. Majority of the participants in the present study were females. This is similar to the study done by Sekhar V et al. in Pondicherry and Glasrug P S et al in University of Minnesota, where most of the study subjects were female i.e. 79% and 84% respectively<sup>10, 15</sup>.

It was seen in the study done by Almas et al that majority (62%) of the participants brushed their teeth with Miswak daily due to Sunnah<sup>16</sup>. However, it was found in the study done by Mwangosi et al that 98.7% of the school teachers were brushing only once a day<sup>22</sup>. It was observed in the present study that around 56.80% of the participants were brushing twice daily. This reflects the social and religious norm of the society in the study done by Almas et al. But when asked for knowledge in the present study regarding brushing frequency then it was found that around 68% knew that one should brush twice daily<sup>16</sup>. Similar results have been reported in the study done by Mota A et al where majority of the teachers (88.7%) believed that a child should brush at least twice a day and expected exceptional oral hygiene practices from children<sup>6</sup>. However, the teachers themselves exhibited moderate oral hygiene practices. So, this shows that the school teachers are practicing the twice brushing habit less frequently even if they have the correct information.

It was seen in the present study, that majority of the study participants (45.23%) had knowledge regarding causes of dental decay i.e. bacteria and sugar. Similar results had been reported in other studies done by Sekhar V et al, Nyandindi et al., and Khan et al<sup>10, 17, 18</sup>. However, it is in contrast to study done by Lang P of China<sup>19</sup>. When school teachers in the present study were asked about their knowledge for tooth cleaning medium and material then it was seen that toothbrush and toothpaste was most frequent answer given by the participants.

As to prevention of dental caries, regular brushing was suggested by 29.95%, regular brushing and avoidance of sweets by 21.76% and regular dental visits by 30.27%. However, in the study done by Altamimi et al it was found that 76 per cent considered toothbrushing, 73 per cent of the teachers suggested the use of Miswak,

and regular dental visits were recommended by 76 per cent<sup>20</sup>. The reason for this difference is that the preventive techniques were differently classified in the questionnaire of the other study.

In the present study, it was observed that 55.44% of the participants had visited the dentist in the past one year and the most frequent reason for visiting the dentist was found to be routine dental checkup (40.47%). Similar results have been found in the study done by Ehezele et al, where 42.4% of the respondents have ever been to the dentist for routine dental checkup<sup>21</sup>.

Around 38% of the study participants from the present study believed that irregular brushing is the main reason behind gum diseases. However in the study done by Sekhar V et al it was seen that majority of the school teachers believed that plaque and calculus is the main causative factor for gum diseases<sup>10</sup>.

The school teachers were asked about the role of fluoride in dental caries prevention. It was observed that 68.64% of the study subjects were aware about the role of fluoride and hence said that fluoride protection is required for caries prevention. In the study done by Sekhar V et al it was found that around 74.5% teachers know that fluoride protects against tooth decay<sup>10</sup>.

Dental floss and other interdental cleaning aids are known as important dental hygiene aids and are essential for removing debris, food particles and plaque from interdental areas of tooth<sup>21, 23, 24</sup>. The percentage of teachers knowledge regarding use of dental floss as accessory dental aid in the present study is very low (7.14%). Interestingly, many of the teachers have knowledge about mouth wash as an accessory tooth cleaning aid (31.29%). Whilst the reason behind this difference could not be ascertained, one probable explanation could be the more promotion of mouth washes in visual media and newspapers.

The present study gives an insight into the knowledge as well as attitude of school teachers regarding oral health. National oral health policy gave special emphasis to preschool children primary and secondary school children, expected and nursing mothers<sup>25</sup>. It has also emphasized on training of trainers. So teachers should be trained for providing oral health educations to the students. No comparison was done among different demographic variables for knowledge

and attitude questions in the present study. The study was done only on urban school teachers of Ballabgarh block. So, further studies can be done on other rural as well as in other blocks of Faridabad district to know about the level of perception among school teachers for oral health.

### CONCLUSION

The school teachers in the present study had fair level of knowledge. School teachers should be trained in imparting oral health education to the parents as well as the school going children about the oral health. Their knowledge should be assessed regularly and further changes in the program should be done in the school oral health program.

**Conflict of Interest:** None

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# Representation of Knowledge through Ontology for Swine Flu Disease in Semiarid Tropical Regions

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## ABSTRACT

The practice of using ontologies in medicine is mainly focussed on the representation and re-organization of medical terminologies. Physicians developed their own specialized languages and lexicons to help them store and communicate general medical knowledge and patient-related information efficiently. Such terminologies, optimized for human processing, are characterized by a substantial amount of implicit knowledge. Medical information systems, on the other hand, need to be able to communicate complex and detailed medical concepts unambiguously. This is noticeably a complex task and requires an intense analysis of the composition and concepts of medical terminologies. But it can be accomplished by fabricating medical domain ontologies for demonstrating medical terminology systems. Moreover, there are limited ontologies available in the domain of pulmonary diseases and as such tropical diseases like swine-flu(H1N1) are yet unexplored. Swine-flu is a rapidly spreading disease and the information for it available from books, newspaper articles and internet which is unmanageable and unorganized. Therefore, in this paper, we propose to develop a medical ontology based information system for Swine-flu. We have implemented this system using Protégé 4.1 Beta Software and then hosted it onto Apache Tomcat Server. The deployed version can be viewed in XML and RDF formats and DL query can be used where user can get answers to their queries when questioned. Finally, to evaluate the performance functional testing with Fact++ Reasoner is used with ontology browser.

**Keywords:** *Ontology, Swine-flu, Protégé, Fact ++ Reasoner.*

## INTRODUCTION

Swine flu strain, causing 2009 pandemic was first observed in Mexico USA. Researchers named it as novel H1N1, as it mainly identified infecting people and the two main surface antigens involved are H1 (Hemagglutinin type 1) and N1 (Neuraminidase type 1)<sup>1</sup>. The H1N1 virus outbreak had previously occurred in India during the 2009 flu pandemic. Integrated Disease Surveillance Programme (IDSP), a Ministry of India, reported 8,544 people to fatal Swine Flu disease between September 2010 and November 2017. The virus is known to spread during monsoon months, and it has been more prevalent in semi-arid tropical regions of India like Maharashtra, Telangana, Andhra Pradesh, Kerala.

As identified, Swine flu is a highly communicable pulmonary disease infecting pigs and the root is one of several swine influenza A viruses. Transmission of swine influenza viruses to humans is uncommon. However, swine

influenza virus can infect humans when contact with pigs or surroundings contaminated with swine flu viruses<sup>3</sup>.

Not only in India, the severity of Swine flu disease in the United States is determined by vast things including traits of affecting viruses, the seasonal timings and how vaccine is fighting with the disease causing virus and the number of people got vaccinated. CDC trails rigorously principally through its national Influenza Surveillance System that keeps track of disease through key indicators like percentage of deaths resulting from respiratory diseases like influenza or pneumonia and the number of hospitalizations, paediatric deaths and rate of visits to clinics for influenza-like illness<sup>2</sup>.

Swine flu related data has been varied. This data needs to be extracted from different places and from different formats to a one place with same format and with particular subject focused, the data itself will

become an easy content of information to refer and the web used for this is semantic web<sup>8</sup>. More the information about diseases that exists in digital form, better the understanding about disease, disease environment, and its cause and so forth. Scientists, researchers and inventors add content pertaining to diseases to the web that is of an immensely diverse nature. This disease information on the web is growing closer to a real universal knowledge base, with the problem of the interpretation of its true context. So there is a lucid requirement for the disease information to be more semantically assembled thus promising a semantic web for disease intelligence. The aim of introducing semantics into the disease information is to enhance the precision of search, but also enable the use of logical reasoning on the disease information in order to answer queries. Also when a logical structure is incorporated to this information it will become machine/computer readable as well as machine/ computer processable, ensuring some kind of intelligence<sup>6</sup> associated with this information.

Disease like H1N1 has its own characteristics changed rapidly at different places of the world and those characteristics reported by doctors at those places are not quickly available to other researchers/doctors in the other side of the world for reference. For example, if a researcher wants to analyse symptoms he may want to use his own set of data as well as other set of data given through other sources. If he manually searches the relevance and freshness of other sets of data, it will be a tedious and error prone task. Although he uses conventional search engines they will only provide much larger set of information which is still hard to refer due to its largeness and unsatisfactory order. If machine can filter in relevance/meaningful, fresh, coherent and consistent data then his task of research will become much easier<sup>7</sup>.

The major focus of this research is to demonstrate how disease intelligence can be achieved through semantic web. The methodology followed in achieving this disease intelligence through web is based on ontologies<sup>9</sup> and the ontologies can be created using OWL(web Ontology Language)<sup>4,5</sup> as well as evaluated by the reasoners available today. The ontology created here is termed as swine flu disease ontology and it serves as a way to constitute the disease domain.

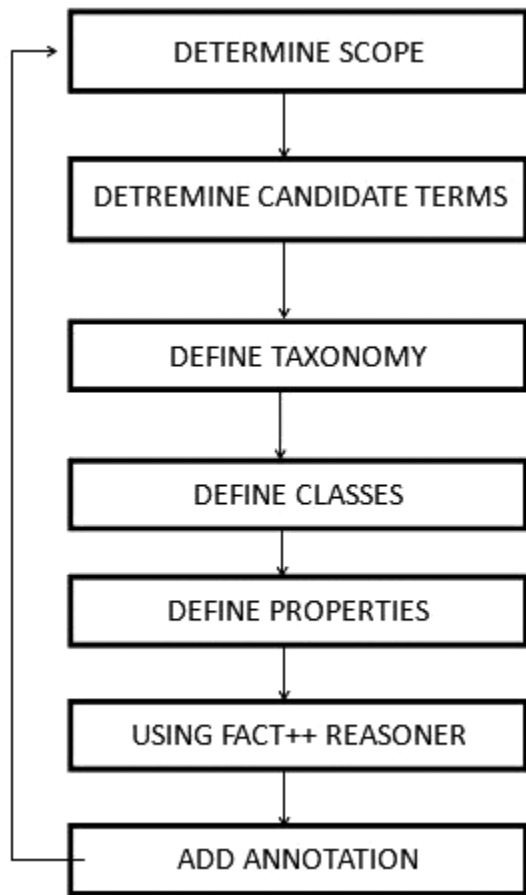
So following are the main objectives of the study:

1. Find out a proper way to extract the information about Swine Flu Disease.
2. Create ontology to extract the information about swine flu disease using a correct web semantic<sup>10</sup> language.
3. Make information extraction available through ontology browser .
4. Carry out a Functional Testing with the help of Fact ++ Reasoner.

**Literature Review-Medical Ontologies:** Latest developments in Information Communication and Technology opens varied prospects for the implementation of high quality health care systems. These technologies confirm the provision for better medical data processing. A main feature of Medical Information System is the explicit communication of intricate details of medical concepts. So, ontologies provide a more efficient knowledge sharing in the field of medicine<sup>10</sup>.

However ,it is difficult to develop such a system and a thorough analysis of structure and concepts of medical terms are required. Ontological approach is very much useful here for representing and integrating them in medical ontology<sup>13</sup>. Medical ontologies have played crucial role in facilitating re-use, propagation and sharing of patient information across dissimilar platforms. They have been used in semantic-based statistical analysis of medical data. Examples include CO-ODE, LinkBase, Medical Ontology Research Program, JULIE at Jena University, GALEN, ON9 Methodology, Gene Ontology Consortium. In addition Bio-portal consists of more than 683 ontologies that include various aspects of medicine such as humans, plants, principled ontologies which are semantically interoperable<sup>12</sup>.

**Methodology-Development of ontology:** The authors are from diverse fields like computer professionals, Medical Informatics and clinical experts from pulmonology field. The following Figure 1 illustrates step by step workflow of the ontology development.



**Fig. 1: Work Flow of Swine Flu Ontology**

It is vital to determine the ontology scope so that the area that ontology covers and the queries that can be answers and also determine the users of ontology. In the case of tropical disease ontology it is clear that unification of information is required. This enhances the chances of constructing decision support tools and provide common terminology for tropical diseases.

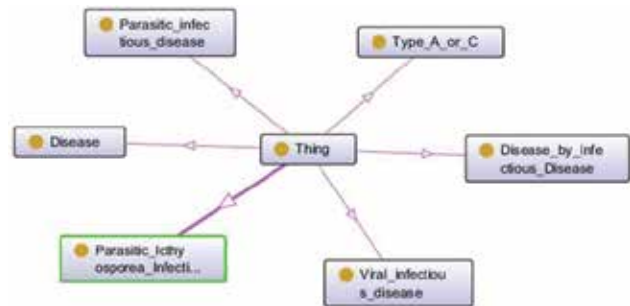
**Determining Scope:** Protege is developed by the Stanford Medical Informatics group and it is now a core technology of National Center for Biomedical ontology(NCBO) <sup>14</sup>. Protege allows OWL format and other formats such as RDF/S,OWL and XML Schema. In addition to it,plugins which comprises 70 plugins which involves ontology visualization, ontology alignment, ontology mapping and rule engines.

**Foundation for Candidate Terms:** The knowledge for swine flu includes Identification of symptoms, therapeutic approach and etiology and epidemiology. The main objectives are from symptoms, ,caused\_by, risk factors, vaccines, drugs, type\_a or type\_c. Domain knowledge is provided by the Faculty of ESI Hospital,Hyderabad.

Formalization was gathered from indexed articles, Research articles and public health domain textbooks. It has been measured that candidate determination is continuous and recurring process .Entities in candidate terms of swine flu disease has some aspects <sup>15</sup>. These aspects are:

- a. Swine Flu should represent highest occurrence of Disease and its diagnosis
- b. Symptoms of individuals
- c. Causes of disease
- d. Its prevention and Vaccines
- e. Etiology

**Taxonomy Definition:** The high level graphical representation of swine flu disease ontology is shown in Figure 2 Term candidates are selected and are written in an unstructured list and are displayed in summary as shown below:

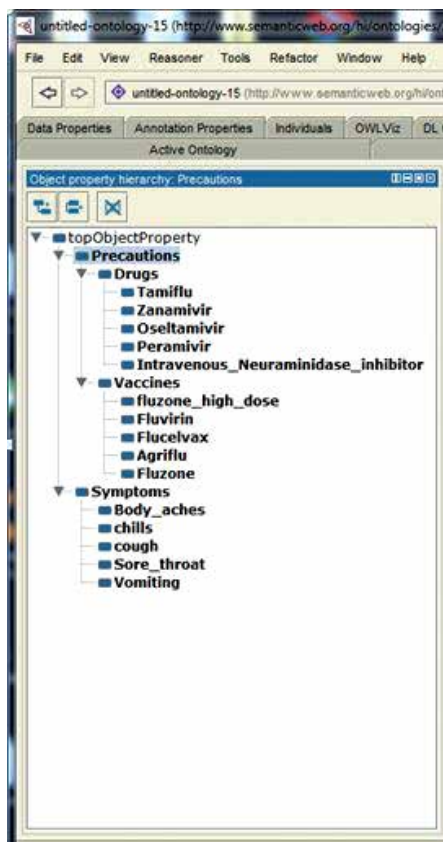


**Fig. 2: Display of Term Candidates in an Unstructured List**

The construction of tropical disease ontology should obey formal ontological principles to prevent interpretation bias on each individual terminology. In this stage, relationship constrains between each individual terminology were developed. Constrain relationship in swine flu disease is based on inter individual relations and are applied between terminologies. This constrain relationship is also inherited relationship, which means relationship are also defined in their individuals and concepts. This relationship type is sufficient for the purpose of indexing and annotating initial infectious disease ontology, especially for medical purposes. Focus of individual-relations of this initial phase is on Disease\_by\_Infectious\_Agents concepts to others listed concepts.

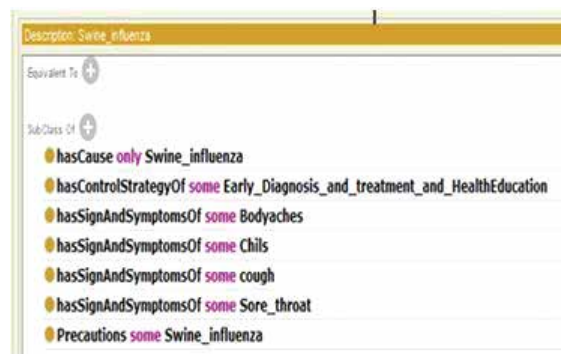
**Interrelationships established:** The relationships are inherited and the inherited relationships can also be represented and are explained in concepts which is enough

for indexing and annotating swine flu disease ontology. The inter individual relations are shown in Figure 3



**Fig. 3: snapshot of inter individual relations in swine flu diseases**

The properties that were used to figure out individual relations for the initial phase can be used as hypernym/hyponym (*is-a*) and meronym/holonym (*has-of*). Description logic Language syntax is used for classification in defining inter-individual relationship of swine flu disease. There are only two types of restrictions used here *some* and *only*. Keyword “*some*” is used to describe classes that participate in atleast one relationship. Keyword “*only*” is used to describe classes that participate in relationships along with this class.



**Fig. 4: Summary of Swine Flu disease properties**

Finally, annotation is added to provide information to classes, individuals and object properties. The swine flu disease ontology provides relationship properties with 70 annotations. Overall structure of Swine Flu disease is drawn using OntoGraph<sup>11</sup> and OWLViz tool in Protégé

Ontology Visualization: After the formation of the ontology file, now we host the link on to the live web browser with the help of a server. The server that is been used in our research is Apache Jena fuseki server. We have installed jena fuseki server through Jena.apache.org. After the installation with the help of the http://localhost:3030/browser/ we got the XML files of the ontology file that has been deployed onto the server.

In order to view the visualization, a process is followed to upload SwinefluDisease1.owl file which is hosted onto the web hosting provider. Apache Jena server runs in web hosting provider and corresponding XML files are generated.

### EVALUATION

The resource developed by us can be used for other applications also it was important to evaluate its correctness. To verify the correctness whether ontology is linking relations and properties correctly or not. So, we configured a Fact++<sup>16</sup> Reasoner in Protege for retrieving DL based queries. When we gave the class name to the reasoner, it retrieved the query in terms of classes, individuals, super classes, domain and range. With the results of the Reasoner, we were convinced that ontology is created without any defects as the system was able to retrieve desired classes, super classes and its associated relations and properties. This ontology gives us the case when treatment was given as an input and it fetched equivalent class, sub-class, super-class etc. In another case we gave causes and executed the query. This fetched all the ancestor super-classes and all the instances of the concept. Similarly each concept, relation and instance was verified for correct results.

### CONCLUSION & FUTURE WORK

In this paper we have demonstrated the development process of swine flu ontology . We have discussed various stages in the development of swine flu ontology. We have also evaluated our ontology using a Fact++ Reasoner which verified the ontology by executing

each class and their properties. As an extension of this work, we would like to enhance the ontology by adding more diseases and its cures. Our future work is to show visualization in a better way using machine learning techniques and using effective similarity measures when it comes to matching one ontology with another. This gives us more accuracy and less computation cost which provides better model for online ontology assessment.

**Source of Funding:** This study was not funded by any Funding Agency

**Conflict of Interest:** None declared

**Ethical Clearance:** This research was approved by the Research and Ethics Committee of the ESI Hospital, Pulmonology center, Chest Diseases, ESI, Hyderabad, India.

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# Knowledge, Attitude & Practices Regarding Prevention of Dengue and Malaria among Residents of Urban Area in Kolhapur City, Maharashtra

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## ABSTRACT

**Background:** Vector-borne diseases account for more than 17% of all infectious diseases, causing more than 1 million deaths every year globally. Since we got epidemic of dengue this year in Kolhapur District, it was very much necessary to plan health education programs in our field practice area. Vector control methods can be successful only if there is community participation and for success of community-based program, it's important to assess community's perception regarding the disease, its mode of transmission and breeding sites. Knowledge, attitude and practice studies help to make educational diagnosis of community.

**Objective:** To assess knowledge, attitude and practices regarding dengue and malaria among residents of urban area in Kolhapur city.

**Methodology:** We conducted community-based cross sectional study to know the knowledge, attitude and practice regarding dengue and malaria in our field practice area of urban health centre selecting 480 residents by systematic random sampling technique.

**Results:** Majority i.e 92% of participants were aware of dengue and malaria as mosquito-borne diseases. Nearly 22% participants could not tell any preventive method against mosquito-borne diseases, 76% people think that preventing these infections is sole responsibility of Government, 32% people don't follow any precautions and around 62% don't follow any method to prevent mosquito breeding in and around house.

**Conclusion:** There is urgent need to increase awareness about mosquito borne diseases in our community with respect to breeding places, all preventive measures, symptoms, treatment options available in order to prevent and control epidemics in future.

**Keywords:** knowledge, attitude, practice, malaria, dengue, urban

## INTRODUCTION

Mosquito Borne Diseases (MBDs) are major health problem in India & growing urban problems because of unplanned urbanization, industrialization & excessive population growth coupled with rural to urban migration.<sup>1</sup>

The world's fastest growing VBD is dengue, with a 30-fold increase in disease incidence over last 50 years. Every year there are more than 1 billion cases and over 1 million deaths from VBDs. In India, 27% population live in malaria high transmission area.<sup>2</sup> Diseases are common in tropical and subtropical regions and places where access to safe drinking water and sanitation system is problematic.<sup>3</sup>

Although, dengue has a global distribution, the World Health Organization South-East Asia Region (SEAR) together with Western Pacific Region bears nearly 75% of the current global disease burden.<sup>4</sup> The sole method of prevention and control is the knowledge, attitude and practices (KAP) for the same. Although, dengue is considered an urban and semi-urban disease

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in recent years due to water storage practices and large-scale development activities in rural areas, dengue has become endemic in rural areas of India as well increasing the scale of the dengue challenge in the country.<sup>5</sup>

## METHODOLOGY

This community-based cross sectional study was conducted from 1<sup>st</sup> July to 30<sup>th</sup> September 2018 in the field practice area of UHTC under jurisdiction of Department of Community Medicine. Data was collected by face to face interview by using pretested, semi structured questionnaire by trained interviewers after receiving approval from institutional ethical committee. The houses for data collection were selected by systematic random sampling technique. One adult respondent from each selected households was selected randomly & verbal consent was obtained before collecting the information. Details were collected by face to face interview regarding causative agents for dengue and malaria, their breeding places, signs and symptoms, treatment seeking behaviour, prevention & control measures actually adopted by the participants were recorded.

- **Study design:** Community-based cross sectional study
- **Study period:** July to September 2018.
- **Study area:** Field practice area of UHTC
- **Sampling technique:** Systematic random sampling by selecting every 5<sup>th</sup> house from total 2460 households.
- **Sample size:** 480.
- **Study tool:** Pretested, semi-structured questionnaire.

Our survey questions focused on socio-demographic profile, knowledge regarding vectors responsible for dengue and malaria both, breeding sites, mode of transmission, symptoms, treatment, attitude & preventive measures actually adopted for malaria and dengue. Data was entered in Microsoft Excel & analysed by SPSS 20 version.

## RESULTS

We interviewed 480 people for gathering the required information for our study. Majority of the participants were males (60%) belonging to age group of 41 to 50 years (40%) and were married (79.5%) & from upper middle socio-economic background (61%).

**Table 1: Knowledge regarding dengue and malaria**

Question	Number	Percentage
<b>Are you aware of dengue and malaria?</b>		
Yes	446	92.9
No	34	7.1
<b>Dengue and malaria spread by-</b>		
Close personal contact	6	1.2
Mosquito bite	438	91.2
Contaminated food, water	8	1.6
Don't know	28	5.8
<b>Do you know breeding sites for dengue mosquito?</b>		
Dirty water	138	28.7
Fridge tray/household water collections/tyres/flower vase	90	18.7
Don't know	120	25
Garbage	132	27.5
<b>Dengue mosquito bites during-</b>		
Daytime	42	8.7
Night	172	35.8
Day & night	82	17.1
Don't know	184	38.3
<b>Different methods to prevent dengue/malaria</b>		
Screens for windows, mosquito nets	82	17.2
Wearing full sleeves clothes	118	24.5
Chemical spraying	134	25.8
Use of odomos/liquid vaporizer	194	40.4
Don't know	106	22.1
<b>Symptoms of mosquito-borne diseases</b>		
Fever	426	88.7
Joint pain, bodyache, headache	188	39.1
Spots on body/rash	18	3.7
Don't know	26	5.4

When we studied knowledge level regarding dengue and malaria, we found that majority of the participants (92%) were aware of both dengue and malaria. Nearly 91% knew that both spread by mosquito bite. Nearly 22% of the people could not tell any method to prevent these diseases while 38% participants didn't know that the dengue mosquito bites during day time.(Table-1)

**Table 2: Attitude regarding dengue and malaria**

Question	Number	Percentage
<b>Are you at risk of getting dengue/malaria?</b>		
Strongly agree	394	90.8
Agree	42	8.7
Disagree	34	7.1
Not sure	10	2.2
<b>If you take precautions can you prevent mosquito-borne diseases?</b>		
Strongly agree	380	81.2
Agree	38	7.9
Disagree	10	2
Not sure	52	10.8
<b>Preventing mosquito-borne diseases is responsibility of-</b>		
Government	368	76.6
Self	42	8.7
Government + self	70	14.5

Regarding attitude towards these diseases, 90% of people believed that they are at risk of getting them while 76% think that preventing these diseases is sole responsibility of Government. (Table-2)

**Table 3: Practices followed to prevent dengue and malaria by study participants**

Question	Number	Percentage
<b>Which method do you adopt to prevent dengue, malaria?</b>		
Wear full sleeves clothes	252	52.5
Use repellent like <i>Odemos</i>	128	26.6
Use mosquito net	48	10
Close doors, windows in evening	372	77.5
Nothing	156	32.5
<b>Precaution followed to prevent mosquito breeding in &amp; around house-</b>		
To empty pots/fridge tray etc regularly	62	12.9
Pour oil/ kerosene in collected water	54	11.2
To close vessels tightly	68	14.1
Nothing	296	61.6

As shown in Table -3, when we studied the actual practices adopted to prevent dengue and malaria 32% of

the people did not follow any method while around 62% participants did not follow any precaution to prevent mosquito breeding in and around house.

## DISCUSSION

In our study majority i.e 90% participants were aware of both dengue and malaria similar results were obtained by study conducted by Mehta D. at Bhavnagar, Gujarat<sup>4</sup> where 88% were aware of mosquito-borne diseases and Ashutosh S<sup>2</sup> in Kota, Rajasthan. Pradeep C<sup>6</sup> in their study conducted in Bangalore reported that 70% of the respondents heard about dengue which was less than our observation. In our study 91% people knew that dengue and malaria are mosquito borne diseases, similar results were obtained by Borker A<sup>7</sup> in their study done at Nagpur, Maharashtra where 88% participants knew that mosquito bite is responsible for malaria and dengue. Little higher results were obtained by Tamilarasi R<sup>8</sup> in research done in urban area of Chennai where 97% of the participants answered correctly about mode of transmission of mosquito borne diseases while study conducted by Nagoor K<sup>3</sup> in Chittoor in Andhra Pradesh reported that only 68% of study participants knew that its mosquito borne disease and also by Bhatt A<sup>9</sup> from Kerala where 65% respondents knew about mosquito borne diseases. When we compared correct information about breeding sites for different mosquitoes, only 19% could tell it correctly about dengue mosquito which was very low compared to findings from Chennai urban area residents (81%) according to Tamilarasi R<sup>8</sup> study and as per findings of Yerpude NP<sup>10</sup> (91%) from study done in Guntur, South India. According to our findings, 88% respondents knew fever as symptom of dengue and malaria while study conducted in Kota, Rajasthan<sup>2</sup> it was known to 97% of people. Similar results were also obtained in the study carried out in Chennai by Tamilarasi R<sup>8</sup> wherein 92% respondents answered it correctly.

Among our study respondents 91% accepted that they were at risk of getting dengue and malaria. According to our observation, 81% people think that dengue and malaria are preventable if they follow precautions while little higher results were obtained in the study conducted in Kota<sup>2</sup> which was around 90%. Results similar to us were obtained in the study carried out by Gupta S<sup>11</sup> at Jhansi wherein they found that 76% of the participants had positive attitude that these mosquito borne diseases are preventable. As per our findings,



only 9% people thought that preventing these diseases is individual responsibility but study carried at Pune by Singru S<sup>1</sup> noted that 31% of the participants thought the same which is higher than our results.

In our study, only 39% of the participants regularly followed preventive measures to prevent dengue and malaria which was very less compared to findings of Nagoor K<sup>3</sup> in Chittoor, AP where 79% of the subjects were following correct practices to avoid these diseases. The study carried out in Pondicherry by Snehalata et al<sup>12</sup> reported that 99% participants followed protective measures which was really appreciable and much higher compared to us. Another study done at Belgavi, Karnataka by Kulkarni RR<sup>13</sup> noted that 90% participants follow preventive measures which are again higher than our results. Study carried out by Babu et al<sup>14</sup> also reported that 98% of participants follow them correctly which is again much higher than our reports. Another study done in Nagpur, Maharashtra by Borkar A<sup>7</sup> reported that 85% of the participants use any of the preventive methods which is again higher than our observation. Findings similar to us were noted by Panda R. in their research done in Bastar district in Madhya Pradesh where 45% of people adopted protective methods against mosquitoes.<sup>15</sup> Study conducted by Joseph N<sup>16</sup> in Mangalore found that 64% of the participants used preventive practices which was again higher than our reports. Another study done in Darjeeling, West Bengal by De MA<sup>17</sup> reported that 47% participants used repellent creams to prevent mosquito borne diseases which was little higher than our reports (26%). As per findings of Yadav SP<sup>18</sup> from their study conducted in Jodhpur, Rajasthan 16% of the participants used repellents which were less than our reports. There is a big gap between the knowledge and the actual preventive measures adopted in the community which has to be addressed on regular basis.

## CONCLUSION

We found that there is a wide gap in knowledge and actual practices that are followed regarding prevention of dengue and malaria in our field practice area. Health education on regular basis is required to modify behaviour of people to adopt preventive measures which will help to prevent such outbreaks in future.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Obtained from Institutional Ethical Committee.

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# Comparative Evaluation of Efficacy of Oral Diazepam and Buspirone in Reducing Anxiety and Discomfort in Mandibular Third Molar Surgery- In Vivo Study

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## ABSTRACT

**Introduction:** Fear of the dentist and dental surgical procedure is a common and potentially distressing problem. Thus, the use of oral anxiolysis is indicated for anxious patients. Aim: - to evaluate and compare efficacy of (oral) diazepam and buspirone in reducing anxiety and discomfort in mandibular third molar surgery.

**Materials and Method:** A prospective, double blinded, comparative split mouth, cross-over study was conducted on 28 patients requiring surgical extraction of bilaterally impacted mandibular third molar. Patient were categorized into two groups : Group A were prescribed tablet diazepam 5mg and Group B were prescribed tablet buspirone 10mg respectively. After a wash out period of 3 weeks the groups were crossed over and the sequence of tablets was reversed. Anxiety levels were recorded on Gatchel's anxiety scale before surgery, 30 minutes after medication, intraoperative, post operatively. Comfort level was subjectively assessed.

**Results:** The results showed that there was no significant difference in the anxiety level in the diazepam group but there was a significant reduction in anxiety in the buspirone tablet group from pre-operative to postoperatively. The subjective comparison of comfort level showed that 78% participants were more comfortable using tablet buspirone, while, only 44% were comfortable with tablet diazepam.

**Conclusion:** This study reveals that buspirone is comparatively more effective than diazepam to reduce anxiety. Also, the patients are more comfortable with buspirone postoperatively.

**Keywords:** Fear; Anxiety; Diazepam; Buspirone; Anxiety Scale; Comfort.

## INTRODUCTION

The third molar extraction is one of the most common procedures performed in oral and maxillofacial surgery<sup>1,2</sup>. As the third molar is the last tooth to erupt

it has the greatest incidence of impaction which may be attributed to the insufficient space in the dental arch. Surgical extraction of third molars is often accompanied by pain, swelling, trismus, and general oral dysfunction during the healing phase<sup>2,3</sup>. All of these including the fear of going under blade causes anxiety and develops fear among the patients and this leads to various complications in later stages. Although related, fear and anxiety differ, in that fear may be considered the physiological process that occurs in the body when threatened by danger, whereas anxiety is the anticipation of the possibility of danger and is perceived to be less immediate in nature<sup>4</sup>. Patients who are fearful and anxious

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indirectly increase the complexity of dental procedures also<sup>5</sup>. Fear and anxieties in dentistry have been estimated in various populations across the world. Dental anxiety level has been reported in the range of 4.2% to 20.9%<sup>4</sup>. Treatment option to help these patients includes behavioral modification, systemic desensitization, hypnosis and guided relaxation, for individuals where these techniques are insufficient and they may require sedation in order to undergo dental procedures<sup>5</sup>. The use of oral anxiolysis is better alternative to parental sedation for the patients who are sufficiently anxious regarding needle and oral surgical procedures. Benzodiazepines (BZ) are most commonly used oral sedative drug with a high therapeutic index. It is categorized under hypnotics. Ingestion of hypnotic dose does not endanger life. There is no loss of consciousness and respiratory depression. It produces centrally mediated skeletal relaxation without impairing voluntary activity. Diazepam is considered the proto-type of benzodiazepine and the “grandfather” of this drug class; it has been available for over 42 years and continues to be widely used<sup>6</sup>. Buspirone is first azapirone, known since 1988 antianxiety drugs distinctly different from benzodiazepines<sup>7</sup>. Unlike the benzodiazepines, buspirone lacks hypnotic, anticonvulsant and muscle relaxant properties, and hence has been termed anxiolytic. As evidenced by clinical trials, buspirone 15 to 30 mg/day improves symptoms of anxiety assessed by standard rating scales similarly to diazepam, alprazolam and lorazepam. Sedation occurs much less often after buspirone than after the benzodiazepines; other side effects are minor and infrequent. In healthy volunteers, buspirone does not impair psychomotor or cognitive function, and appears to have no additive effect with alcohol. Evidence suggests that buspirone has limited potential for abuse and dependence<sup>8</sup>. But it is surprising that no clinical comparative studies have been done in dentistry for the use of tablet buspirone as oral anxiolytic drug. There are various scales in literature to check the level of anxiety like Modified Corah Dental Scale, Spielberger’s State Trait Anxiety Inventory and Kleinknecht’s Dental Fear Survey, Gatchel’s ten point scale etc<sup>9</sup>. Gatchel’s ten point scale is simple to use which checks subjective level of anxiety in a simple ten point scale. Thus, this study used Gatchel’s ten point scale to assess the efficacy of antianxiety drugs<sup>10</sup>. The purpose of the study was to evaluate and compare efficacy of oral diazepam and oral buspirone in reducing anxiety and discomfort in mandibular third molar surgery.

## MATERIALS AND METHOD

This prospective, double blind, comparative split mouth, cross-over study was conducted on 28 patients reporting to the Department of Oral and Maxillofacial Surgery, of Dr D Y Patil Dental College and Hospital, Pimpri, Pune requiring surgical extraction of bilaterally impacted mandibular third molar and with similar Pederson’s difficulty index<sup>2</sup> range from 5-7. Institutional ethics committee clearance was obtained prior to commencement of the study. Patient with history of allergy to benzodiazepines or buspirone and any medical history that contraindicate use of diazepam and buspirone e.g. depression, pregnancy, lactating, personality disorder etc. were excluded from the study. Patient and relatives of the patient were explained about the procedure and the study. Informed written valid consent was taken from the patients for participation in the study. Pre operative investigation like hemoglobin level, bleeding time, clotting time and blood sugar level was carried out for each patient. 28 patients were recruited for the study. Patients were divided into 2 groups equally with 14 participants in each group by SNOSE (sequentially numbered opaque sealed envelopes) to avoid bias. Group A patients were prescribed tablet diazepam 5 mg and group B were prescribed tablet buspirone 10mg respectively, once before the surgical procedure. Perioperative anxiety was recorded using Gatchel’s 10-point anxiety scale, where a score of 1 indicates no fear, a score of 5 indicates moderate fear, and a score of 10 indicates extreme fear. Comfort level was subjectively assessed as “Yes” or “No”. Anxiety was recorded preoperatively, 30 minutes after medication, intraoperatively and postoperatively. Standard surgical procedure for removal of impacted mandibular third molar was used. Standard scrubbing, painting and draping was done. Local anesthesia 1:200000 lignocaine with adrenaline administered. Incision made for third molar surgery, mucoperiosteal flap was reflected, bone guttering and tooth sectioning was done. Tooth was luxated out of the socket. Wound debridement and bone filing was done. After achieving haemostasis, wound closure was done with 3-0 black silk. Patients were discharged with analgesic and antibiotics. Patients were reviewed after seven days for suture removal. After a wash out period of 3 weeks the groups were crossed over and the sequence of tablets was reversed. The surgical extraction of the contra lateral side was done, the same procedure was repeated

and all the parameters were recorded in same manner. All procedures were carried out by the same operator. Statistical analysis for the purpose of evaluation, the data of all the 28 participants using Diazepam and Buspirone was categorized separately. Repeated measures ANOVA and posthoc tukey test and chi-square test was used for statistical analysis using SPSS version 17. A p value of  $p < 0.05$  was considered statistically significant.

## RESULTS

**Table 1: Comparison between the anxiety levels at different time periods for the Diazepam group**

	Pre-op	After 30 mins	During extraction	Post op
Diazepam group	4.64 (1.28)	4.17 (0.98)	4.32 (1.36)	3.85 (1.29)

$F=1.97, p > 0.05$  (not significant)

A total of 28 patients ( 16 males and 7 females) with age range of 18-50 years (mean age of 29.03 years) were included in the study. Anxiety The mean anxiety in Gatchel’s anxiety scale rating in Diazepam tablet group: pre operatively , 30 minutes after giving medication , during extraction and post operatively was,  $4.64 \pm 1.28$ ,  $4.17 \pm 0.98$ ,  $4.32 \pm 1.36$  and  $3.85 \pm 1.92$  respectively [Table 1]. The reduction in anxiety preoperatively till post operatively was not statistically significant ( $F=1.97, p > 0.05$  )

**Table 2: Comparison between the anxiety levels at different time periods for the Buspirone group**

	Pre-op (1)	After 30 mins(2)	During extraction(3)	Post op(4)
Buspirone group	4.92 (1.84)*	3.96 (1.5) <sup>a</sup>	3.39 (2.02)*	2.67 (1.67) <sup>a*</sup>

$F=8.08, p < 0.05$  (statistically significant) Post hoc tukey test significant for 1\*3, 1\*4 and 2<sup>a</sup>4

The mean anxiety in Gatchel’s anxiety scale rating in the buspirone tablet group: pre operatively, 30 minutes after giving medication, during extraction and post operatively was  $4.92 \pm 1.84$ ,  $3.96 \pm 1.5$ ,  $3.39 \pm 2.02$  and  $2.67 \pm 1.67$  respectively [Table 2]. Overall, there was reduction in anxiety from pre-operative to post-operative and the difference was statistically significant ( $F=8.08, p < 0.05$ ). Post hoc tukey test shows that there

was a significant difference between anxiety Pre-operatively and during extraction and pre-operatively and post-operatively and between after 30 minutes to postoperatively.

**Table 3: Comparison of the comfort level between the 2 groups**

	Yes	No
Diazepam group	12	16
Buspirone group	22	06

$X^2=7.48, p=0.006$

Comfort On subjective comparison (i.e on verbal response only): The comfort level in patient with tablet diazepam and tablet buspirone was 78%, i.e. 22 out of 28 participants were more comfortable while using tablet buspirone and only 44.8%, i.e. 12 out of 28 participants were comfortable which tablet diazepam. There was a statistically significant difference between the comfort level ( $X^2=7.48, p < 0.05$ ) [Table 3].

## DISCUSSION

Anxiety was the reason why 7.6% of patients had ever missed, cancelled, or avoided a dental appointment<sup>6</sup>. Of those with high anxiety, 49.2% had avoided a dental appointment at some point because of anxiety as opposed to only 5.2% from the no or low anxiety group<sup>6</sup>. Encountering patient who are fearful and anxious is common in dental practice and these factors can increase the complexity of dental procedures. Studies suggested dental anxiety is usually higher in tooth extraction, in procedure involving dental anaesthesia and when rotatory instrument is needed. For these reasons, the surgical extraction of impacted lower third molars is a procedure that almost certainly involves some degree of anxiety in the patients<sup>11,12</sup>. The study subject had age range from 18-40 years with no systematic disease, extreme of ages preventing anxiety due to fear of unknown or previous experience. This split mouth design reduces possible research bias by avoiding physiological and psychological differences between tested individuals<sup>13</sup>. For surgical extraction of impacted third molar, both the anti-anxiety drugs can be compared for same patient, as the study includes bilaterally impacted teeth with approximately same Pederson’s difficulty index<sup>2</sup> range from 5-7. A double blind study prospective cross over

design was used to avoid bias between the groups. The age and gender of the patients did not have any significant relation with the anxiety level<sup>9</sup>. The use of oral anxiolysis is better alternative to parental sedation for the patients who are sufficiently anxious regarding needle and oral surgical procedures. This finding is conferred by study conducted by Dionne RA et al in their study where oral benzodiazepine relatively fast onset, short elimination half-life, and minimal respiratory and cardiovascular effects make it desirable for outpatient use compared with other sedatives that have less favorable pharmacodynamic and pharmacokinetic properties<sup>14</sup>. The use of an orally administered drug avoids exacerbating anxiety in patients who are fearful of venipuncture. The cost of care also is substantially less for an orally administered agent compared with that involving a parenterally administered sedative<sup>14</sup>. Buspirone does not impair any higher function nor does it cause any sedation<sup>5,6</sup>. Available literature suggests that buspirone has limited potential for abuse and dependence. It is effective in the treatment of patients with generalized anxiety disorders and anxious patients<sup>15</sup>. Buspirone leads to less depression of the central nervous system than benzodiazepines or clorazepate, and that it appears to be effective in reducing symptoms associated with cognitive and interpersonal disorders. Oral buspirone is safe drug for helping a patient to cope pharmacologically and behaviorally with anxiety. In our study, it is seen that as compared to pre-operative anxiety, the anxiety had reduced after 30 minutes. Even during the procedure, the anxiety was still less with tablet buspirone. The difference between pre-operative and postoperative anxiety had significantly reduced in buspirone group. This finding corroborates with finding of studies conducted by Goldberg HL<sup>16</sup> and Hulscher BE<sup>17</sup>. In this study, there was no significant reduction in anxiety in the diazepam group. Diazepam is considered as prototypical benzodiazepine which is most commonly used oral sedative drug. For the anxious patient with a history of alcoholism who requires premedication, oral buspirone appears to be a safer agent than benzodiazepines because of the absence of CNS depression. Similarly, for a patient identified as a drug abuser or a potential drug abuser, buspirone appears to be preferable because its mechanism of action avoids tolerant benzodiazepine receptors<sup>17,18</sup>. The advantage of this study was, the same sample had experienced both the drugs and also there was a 3 weeks wash out period before the cross-over. One limitation of the study was that, there was unequal distribution of participants from the three

levels of anxiety. Majority were from mild and moderate group. A further study is recommended, by recruiting equal number of samples in the three anxiety levels (mild, moderate and severe) and checking the efficacy.

## CONCLUSION

Within the limitation of the present study, it can be concluded that, buspirone was comparatively more effective in reducing the anxiety as compared to diazepam. The patients were more comfortable with buspirone than diazepam. It can be recommended that one tablet of buspirone can be prescribed for significant reduction in the anxiety level of patients undergoing surgical removal of impacted mandibular third molars.

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Obtained from Institutional Ethics Committee, DR D Y Patil Dental College and Hospital, Pimpri, Pune.

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# Post Marital Depression among Women

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## ABSTRACT

Marriage, for women in a patriarchal society is an enormous transitional process. Being the centre of attention in her house is not valued much after her marriage and that is what all women can relate to. She juggles with new responsibilities and expectations which is quite overwhelming for her. But with the feelings of worthlessness and feeling trapped and bound in loveless and thankless bond, sets in depression. Depression is a state of mind producing serious, long term lowering of enjoyment of life or inability to visualize a happy future. Therefore, this study aims to find out the level of depression among women in relation to various factors of life which can examine their experience of well-being in their marriage life so far. A self-prepared questionnaire was developed to assess the level of post marital depression among women, the samples were selected randomly from Coimbatore city and the total number of participants were 66 married women. Self-prepared questionnaire on post marital depression was constructed to assess their level of depression. Results revealed that young aged women experienced higher post marital depression due to new family life, high expectations from in law's and husbands and managing home and work and managing children. But the study did not observe any significant difference among working and non-working women's post marital depression.

**Keywords:** Married women, Post Marital Depression

## INTRODUCTION

Nations have perished, and people have lived without going to schools, churches, but rarely without marriage and family. In the complex and fast-moving world of today, where the unexpected has become a part of everyday life, it is a relief for everyone to realise that the family lives provides our needs and comfort as it has been providing for centuries. It is the place where we all get the satisfaction of basic human needs and rights. Hence, even with all the possible shortcomings, we prefer to be in close connection with our family members. And even those people whose home life has had more sadness than happiness often look forward to a happier marriage and family life for themselves and as well as for their children. <sup>[1]</sup>

Marriage is a known as a social system through which a man and a woman come closer to and start to live together and bond with each other. Intact and harmonious marital relationships are vital not only for the psychological health of the individual, but also for offspring and thus, for the society in the broader perspective. But unsatisfying and stressful marital relations leads to an increased emotional turbulences and marital disruption. <sup>[1]</sup>

Marriage is simply a promise which involves a lot of affection and obligations for maintaining and balancing peace, harmony, happiness and strong family bonds. The most vital relationship that a man and a woman could share is nothing but marriage. It comprises of emotional and most importantly a legal commitment. Moreover, to choose a partner and to enter into a committed contract is considered to be both matured milestone and also personal success. People get married for various reasons, such as; to love and receive love, to live in peace, to have a company, and the desire to have their own children."<sup>[2]</sup>

Marriage is a socially genuine union between the 2 sexes, that begins with a public announcement and with some ideas of permanence; it is assumed that rights and responsibilities between the spouses and children originates with a strong bond of marriage contract. Marriage is the key to adjust, involve and satisfy one and other in a positive way. Marriage is our most common routine in one's lifetime. <sup>[3]</sup>

Women with nearly over half of the population around the globe, especially in developing countries like India, should pay attention to their mental health and join mental health programs. Women's significant



roles in global development of society, child care, family endorsement and work, their mental health maybe affected by many socio-cultural factors. [4]

Women are essential to all facets of society. However, there are multiple roles that they play in society that renders them at a bigger risk of experiencing mental problems than others in the community or society. Women bear the load of many responsibilities which are associated with being a wife, mother and career minders of others and many more. In adding to all of that there are many pressures placed on women, like, they have to bear gender discrimination and the associated factors such as poverty, hunger, malnutrition and overburden of work. An extreme but common expression of gender inequality is in sexual and domestic violence, perpetrated against women. These forms of socio-cultural violence, contribute to the high occurrence of mental problems experienced by any women in the country such as depression. [5]

The husband and wife should be able to live together, cooperate with each other, share their feelings, ideas, beliefs and opinions, accommodate each other while adjusting with their flaws and accepting them the way they are for a better and a happy life. As marriage is a very important institute, it helps in solving various problems such as social, traditional, private and sexual issues. [6]

**Based on this the following objectives were made:**

- To assess the post marital depression among women
- To know the influence of age and their work status with post-marital depression.

**Hypotheses**

- There is no significant difference observed among age and post marital depression
- There is no significant difference observed among work status and post marital depression

**MATERIALS AND METHOD**

Coimbatore was the area selected for the conduct of the study. A total of 66 married women were selected by convenient sampling method. A self-prepared questionnaire on ‘Post marital depression among women’ was framed to assess the level of depression among married women. This questionnaire consists of 45 statements which contains positive and negative

statements and can be rated in three-point scale. Higher the score, higher the level of depression. Investigator developed rapport with the selected married women and explained about the purpose of the study and also confirmed that confidentiality of the study would be maintained. The collected information’s were analysed and appropriate statistical applications were applied to know the results.

**RESULTS AND DISCUSSION**

**Table 1: The level of Post marital depression among women based on age**

Sl. No.	Age	Depression level			
		Low		High	
		N	%	N	%
1	20-40 (33)	11	33.3	22	66.6
2	41-60 (33)	13	39.4	20	60.6

Table-1 predicts the level of post marital depression among women. Among selected samples, majority of young aged women’s (66.0%) are suffering from post-marital depression than middle aged women (60.06%).

**Table 2: Mean, SD and t-value of Post marital depression among women based on age**

Sl. No	Age	N	Mean	SD	t-value
1	20-40	33	129.82	36.007	2.964* p=.004
2	41-60	33	109.12	17.681	

\*significant at.05% level

Table-2 shows the mean and SD value of Post marital depression among young aged women were 129.82 and SD 36.00. Where as in case of middle aged, the obtained mean and SD values are 109.12 and SD 17.68 respectively. The calculated t-values of post marital depression among young and middle-aged women is 2.964 with p value.004 which is significant at 0.05% level. From this table we can conclude that young aged married women were experienced higher levels of post-marital depression compared to middle aged married women’s. Hence hypothesis 1 could be rejected.

This study is contradictory to the study of Sneh. (2017) in the study of “Marital Adjustment and depression among couples” found out that married women from the middle age group have been experiencing high levels of depression that young age married women.

**Table 3: The level of post marital depression among women based on work status**

Sl. No.	Work status	Depression level			
		Low		High	
		N	%	N	%
1.	Working (31)	14	45.1	17	54.8
2.	Housewives (35)	10	28.5	25	71.4

Table-3 predicts the level of post marital depression among women based on working and non-working status. Among selected samples, majority of house-wives (71.4%) are suffering from post-marital depression than working women (54.8%).

**Table 4: Mean, SD and t test value of Post marital depression among women based on the working status**

Sl. No.	Work status	N	Mean	SD	t-value
1.	Working	31	115.45	31.739	-1.024 Ns
2.	Housewives	35	123.03	28.385	p=.313

Ns- Not significant

Table-4 shows the mean and SD value of Post marital depression among working women were 115.45 and SD 31.739. Where as in case of housewives, the obtained mean and SD values are 123.03 and SD 28.385 respectively. The calculated t-values of post marital depression among working women and housewives is -1.024 with p value.313 which is not significant at 0.05% level. From this table we can conclude that housewives were experiencing higher levels of post-marital depression compared to working women's. Hence hypothesis 2 could be accepted.

This study is contradictory to the results of Hina. (2007) in their study "Marital Adjustment, Stress and Depression Among Working and Non-Working Married Women". They examined working and non-working married women (150 total). The results showed that women who were working had to face much more problems in their marital life and suffered from depression at a larger amount than non-working married women.

### CONCLUSIONS

Post-marital depression is the common illness affecting married couple with different perspectives and in different socio-demographic factors in India and all over the world.

At the individual and family level, post-marital depression leads poor quality family life, causing problems with marital life. Failure to recognise post-marital depression at an early stage may leads to poor adjustments among couples and leads to mental or emotional illness. It is essential to find out the level of post-marital depression among women and hence the present study focussed to assess the post-marital depression among married women in Coimbatore city. To conclude, one may develop depression due to lack of love and affection with spouse, lack of trust, lack of adjustment with in-laws, lack of entertainment, Lack of companionship, giving more importance to in-laws rather than wife, lack of help by husband in child rearing, lack of income/low income, due to work schedule, less time for couples to be together and male oriented society.

This present study shows that post marital depression is high among young married women hence it is very essential to provide appropriate intervention for the affected young married women for her future health and well-being of family.

### Conflicts of Interest:

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**Ethical Clearance:** Taken

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# Various Techniques Used to Diagnose Psychogenic Non-epileptic Seizures (PNES): A Brief Overview

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## ABSTRACT

Psychogenic non-epileptic seizures (PNES) mimic epilepsy with multiple biopsychosocial etiology without involvement of cortical activity as in epilepsy. Till date professionals are facing problems in its basic categorization which creates is a big challenge in its diagnosis. Although video-encephalography is the gold standard for the diagnosis of PNES, but it is restricted due to its cost and availability issues. Therefore, professional use other techniques like semiological details: ictal and post-ictal observation, psychological measure, neuro-physiological measures, induction proctols and bio-chemical markers etc. These techniques or procedures are having their own limitation. This paper will provide a brief overview of possible diagnostic procedure involved in PNES diagnosis.

**Keywords:** *Epilepsy, Psychogenic non-epileptic seizures, Diagnosis, Video-encephalography.*

## INTRODUCTION

Psychogenic non-epileptic seizures (PNES) are episodes of altered movement, sensation, or experience similar to epilepsy but caused by psychological process with multi facet etiology <sup>[1]</sup>. PNES are such class of pseudo-neurological condition which poses challenge to medical professionals to diagnose it because still PNES is in its infancy stage and requires further elucidation. Further, PNES is classified under dissociation and conversion disorder under ICD-10 and DSM IV respectively <sup>[1]</sup>. However, presently it is classified under somatization disorder under DSM5 criteria <sup>[2]</sup> although datable.<sup>[3]</sup> Further, dissociation and conversion shares much similarity with PNES and it is the major co-morbid condition with PNES which pose difficulty for the professionals to differentiate between

them. Therefore, one peculiarity which differentiate between PNES and dissociation/conversion disorder is that PNES is characterized as sudden intensification of symptoms (paroxysmal) but in somatization/conversion such paroxysmal elements are absent <sup>[4, 5, 6]</sup>. Further, PNES finds home neither in psychology nor in medical setting because none of the wing such as its psychology, neurology or psychiatric claims PNES to be in its realm.<sup>[7]</sup> Thus patient pirouette between psychologist, neurologist and psychiatrist which is troublesome for the patients and puts them in unnecessary economic burden, if unknowingly they are exposed to anti-epileptic or anti-convalescent medication.<sup>[8]</sup>

Further there is huge population who are suffering from mental disorders and according to one report about 20% <sup>[9]</sup> of adults in India are suffering from psychiatric disorders. Moreover many of them among cases shares co morbidity with PNES. One point should be addressed here that regarding PNES, handful of epidemiological studies has been conducted in India. Therefore the actual epidemiology of this disorder needs elucidation. However, studies conducted in American and European continent reported the prevalence of PNES ranging from 2 to 33% <sup>[10]</sup> in general population and 5 to 20%

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among epileptic population. In epilepsy there is an abnormal discharge in the brain, whereas PNES is caused by emotional turmoil condition.<sup>[3, 11]</sup> However some recent studies have come up with the findings of cortical involvement<sup>[12,11, 13]</sup> but still this notion is under elucidation process.

**Diagnostic proctols used by professionals:** It is very difficult to differentiate between epilepsy and PNES because there lies difference only in their degree of occurrence and severity. In addition, the intractable and refractory state of epilepsy has further complicated the issue. Though recent decade has evident the advancement of PNES diagnosis but still the mean latency period is 7.2 years.<sup>[14]</sup> Further, it is much prevalent practice regarding PNES diagnosis is that, professional much rely on the exclusion of epilepsy. Thus misdiagnosis is possible because ruling out epilepsy possibility does not mean that a person is suffering from PNES.

At present, the gold standard to evaluate PNES is video-encephalography (V-EEG)<sup>[15]</sup> but is too costly with less availability.<sup>[16]</sup> Therefore professional depends upon other techniques like semiological details: which includes ictal and post-ictal observation (like respiration pattern, motor movement, body-postures), neurophysiological measures, interactional pattern, psychological measures, various induction/provocation techniques<sup>[17]</sup> as well as various chemical bio-markers.<sup>[18]</sup> to evaluate PNES patients Following is the brief description of some of the techniques.

**With semiological signs:** Semiological details are the first hand information which professional attains while diagnosing PNES. It includes ictal and post-ictal signs which are crucial for the professional to make a rough assessment of the patient's condition because epileptic and non-epileptic symptoms are almost close to each other and the difference lies only in the degree of occurrence Commonly while diagnosing PNES from epilepsy a professional ask about the onset of seizure activity, frequency and duration of seizure episodes, information regarding body movement (such as limb, trunk, and pelvic movement ), tongue bite position, activity in facial position during the seizure episodes and about eyes opening and closure. Professionals also seek valuable information from patients attendants regarding cognitive make-up like how was the memory of the patient after seizure episode, voice and awareness of the patient during and after seizure episode. In addition,

signs such as injury occurrence, incontinence and respiration pattern are also some important semiological details which are considered by professional while differentiating between epilepsy and PNES<sup>(14, 19, 4)</sup>

**With psychological investigation:** PNES has been explained lucidly by Sigmund Freud. Before Freud, Mandeville, Charcot and Gowers has given their valuable insight to understand its pathphysiology and underlying psychological mechanism. Equivocally, psychological factors are assumed behind causation of PNES. Further, patients who are suffering from PNES experience episodes of severe dissociation thus affecting their thought, feelings, memories, and identity. Also, They are unable to identify<sup>[20]</sup> and regulate their emotion<sup>[21]</sup> Since, they are unable to recognize and regulate their emotion (majorly negative and painful) which remains suppressed for a long time, where it gets converted into bodily symptoms and manifest in form of seizure<sup>[8]</sup>

Majorly psychological factors are assumed behind the cause of PNES and are widely accepted. There is evidence that psychological factors accounts 95% in causing PNES whereas organic factor causing only 5% of the cases.<sup>[22]</sup> Most of the PNES patients are reported of being associated with depression, anxiety, mood disorders, factitious, somatoform, personality, and posttraumatictraumatic stress disorder.<sup>[23, 24, 25]</sup> Further, <sup>[26]</sup> claimed that dissociation and conversion disorders are found among 90% of the cases suffering from PNES. Therefore, it forms a strong background to see the possibility of psychopathology among PNES patients providing promising platform for professionals to differentiate PNES from epilepsy.

Thus during diagnosing of PNES patients professionals may apply various psychological test to differentiate it from epilepsy because there is high probability that PNES will score more on psychopathological orientation as compared to epilepsy patients.

**With Induction/provocation protocol:** We have discussed that how psychological measures and semiological details are helpful in diagnosing PNES from epilepsy. Besides, induction or provocation techniques are also being frequently used by professional to differentiate PNES from epilepsy. Induction or provocation protocols are such maneuver of activity which leads to seizure activity if it were of psychogenic in nature, often this procedure is used during V-EEG.

Various induction techniques like compressed temple region (CTR), verbal suggestion (VS), tuning fork application (TFA), moist swab application (MSA), torchlight stimulation (TLS), and intra-venous saline injection (SI) are largely employed. [17, 27] Among these induction techniques SI is being frequently used in which normal saline water is injected and patients is told that this will provoke seizure, if there, with VEEG. These induction techniques are not sole used to diagnose PNES but play a complementary part with other diagnostic procedure to make sure diagnosis. These techniques are easy to administer like in CTR: temple region is gently massaged with suggestion that this activity will bring seizure in the patient, if present. In MSA also temple region is involved. In VS and TLS patients are stimulated through suggestion and torchlight on their eyes respectively. One catch with this protocol is that patient who are fake becomes prey to this procedure and are identified though, these are deliberate effort but are unconscious in nature.

**With neuro-physiological measures:** Recent and past decade has evidenced some researches that have shifted its orientation from psychoanalytic view to more concrete neurophysiological base. These researches have argued the involvement of cortical abnormality and degeneration in particular brain area responsible for PNES like episodes supporting the physiological causation behind PNES. Number of studies have investigated the organic pathology of PNES and concluded that PNES is caused due to organic brain pathology and dissociation between neural networks. [28, 29, 30] PNES patients have disruption in their thought, memories, feelings, and sense of identity and lack ability channelize their emotion. These all affective function are governed by specific brain areas like somatosensory area, insular area, orbito-frontal area, frontal area, parietal area, and other association which work together and help individuals to deal with the current demand of the situation. [12] Therefore any abnormality/degeneration/atrophy in this area can be potential physiological marker to distinguish between PNES and epilepsy can be used for diagnostic purpose. Further alteration in resting-state network, fronto-parietal network, sensorimotor network and default-mode network have been found more in PNES. Moreover, degeneration in motor, pre-motor, sensorimotor region, sub-cortical region and default-mode network region have been more among PNES patient. Therefore, with the help of neuro-imaging techniques professional can be sure for PNES diagnosis.

**With chemical bio-markers:** PNES research professional have evidenced chemical bio-markers to differentiate between PNES and epilepsy. Biomarkers like, creatine kinase, neuron-specific enolase (NSE), cortisol, neuropeptides (ghrelin and nesfatin-1) and platelet membrane serotonin transporter have been found in elevated level in epileptic patients as compared to PNES. [19] Besides this serum prolactin (PRL) and cortisol level are also promising biomarkers to diagnose PNES because there is no any evidence of increased cortisol level if seizure was of psychogenic in nature. Thus professional can rely on chemical biomarkers to differentiate PNES from epilepsy and can be subsequently be assessed with other diagnostic procedure.

## CONCLUSION

Mainly in diagnosing PNES patients from epileptic patients professional much rely on semiological details and patient's past history of seizures activity to make a rough diagnosis about the type seizure activity. But this is also suspected because semiological details are usually given by the patient of the attendant which can be faulty or full of errors. There is also possibility (especially in case of PNES) that patients may lie in order to be diagnosed as ill because most PNES case are attention seeker. Moreover, the semiological specificity are almost close to each other and is mediated through various factors and can vary from person to person which pose challenge for professionals. Moreover, till now there is no any single equivocally agreed semiological etiology which is widely accepted. However, diagnosing the type of seizure activity vary from professional to professional (due to experience). Thus on the basis of semiological history and diagnosing seizure activity (labeling as PNES) can be skeptical and need further investigation though, it gives valuable information and is promising.

One noted problem with PNES patient is that they are first usually seen by the neurologist because medicine or general physicians consider it being as neurological case. Normally the PNES cases are having epileptic manifestation but underlying pathology is psychological (which is not dealt by neurologist). Thus neurologist misses psychological aspects and sometimes the patient is put on anti-epileptic drugs. Which creates unnecessary problem and medication cost for patients. Second, if diagnosed for PNES where condition of the patient is so pronounced and obvious close to neurotic behavior,

patient is referred to psychiatric ward. In Indian settings it is thought to be as taboo to go to psychiatric ward and sometimes patients denies consulting (even attendants, if case is female) which worsen the situation more. There in psychiatric ward patients are put on medication which is good because in number of cases depression, anxiety, mood disorders, personality disorders or PTSD are comorbid condition and help a lot in managing the patient. But the thing which is left that they are not psychologically treated and therapeutic intervention merely applied to most cases. It is very much important to give psychological intervention and therapy because patients have to get rid of his/her faulty processing and have to develop insight into his/her problem which is only provided by clinical psychologist. In addition, people are less aware about the role of psychologist in Indian setting. Also, the cost and time for psychological intervention is more costly and patient is not having patience to deal with it especially among middle income group (observed in hospital by researcher).

Further, in diagnosing PNES patients the role of neuro-physiological measure is limited because the role of cortical degeneration and alteration of circuits in specific areas of brain is evidenced only in present and previous decades. Therefore its use is limited and in India we are lacking the required infrastructure and technology to put it on public platform. Moreover again the financial position of patients limits him/her to go through such costly procedure. The induction and provocative techniques to distinguish between epilepsy and PNES are mainly used in combination of other techniques to help in clearing the diagnosis. However chemical biomarkers also provides a conclusive help but it has certain limitation because the electrolytes or markers like PRL or cortisol should be measured in particular time after seizure activity then only it is useful to distinguish between PNES and epilepsy.

Thus we can conclude that all the diagnostic procedure are more or less helpful to diagnose PNES but none of them claims hundred percent proficient, though when used complementarily to each other provides definite diagnosis.

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# A Study on Problems and Difficulties in Implementing Knowledge Management Practices in Education Sector

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## ABSTRACT

Nowadays managing knowledge has become challenging task for management. The main objective of this research is to study the problems and difficulties in implementing knowledge management practices in private engineering colleges in and around Chennai. Although, knowledge management has been widely discussed by many academics and practisers, there is relatively little information only available on problems and difficulties faced by management in implementing knowledge management practices. The paper aimed at examining the problems and difficulties in implementing knowledge management practices related to demographical characters of employees in education sector. In this study questionnaire were issued out conveniently to professors in private engineering colleges in and around Chennai. Out of 150 copies of questionnaire administered, 132 were collected and analyzed. SPSS software was used to analyze and interpret the questionnaire. Weighted average and ANOVA are used to prove and disapprove the hypothesis.

**Keywords:** *knowledge management practices, Education sector, Problems and difficulties, Demographical characters.*

## INTRODUCTION

Globalization has become the contemporary element of today's business environment. This globalization has given rise to other elements like intense competition, changing organizational structures, technical improvements in information technology and rise in knowledge management. Among them knowledge management has started to play a vital role in business organizations. Knowledge management has given new insights and understandings to complex mechanisms which governs organization's effectiveness. This contemporary concept has its own history that can be traced from mid's 1975 onwards. Management thinkers like Peter Drucker, Peter Senge, and Paul Strassman from United States are said to be the major contributors to knowledge management. Proceeding on to late 1970's the contributed knowledge management was understood and diffused within the organizations. During the 1980's the knowledge management was treated as comparative asset which was utilized to make strategies and methods in business organizations. It also entered into new usage in conferences, books, journals etc. Further in this period knowledge management also saw the development of systems and also had other developments like

knowledge acquisition, knowledge engineering, and knowledge based systems etc. In 1990's several U.S., European, and Japanese firms started to institute for in-house knowledge management programs.

By the mid-1990's Programs on knowledge management was growing and this happened via the internet technology. Along with these other programs like conferences, seminars also grew and organizations started to focus on knowledge based resources. At present this concept of knowledge management has been utilized by the organizations in order to achieve competitive advantage. As knowledge management has started to gain importance in recent day's contributors like wiig(2000) has emphasized that knowledge based assets are vital for viability and success at any level. The commonly quoted definition for knowledge management is "identify, capture, structure, value, leverage, and share an organization's intellectual assets to enhance its performance and competitiveness".

In today's competitive business environment, most educational institutions including self-financing engineering colleges are struggling to meet the increasing demands put upon them by their customers, competitors,



sustain a competitive advantage that will exceed the current and future demands placed upon them. So it is important to create an appropriate KM Practices. KM is not a single program or series of programs or projects, but the synthesis of core business processes that should permeate every aspect of an institution. But implementing a new practices has lots of difficulties due to lack of interest of employees, risk averting nature of employees, facilities provided by top management etc.

### REVIEW OF LITERATURE

According to **Maryam Alavi et Al. (1999)**<sup>4</sup> in their article “Knowledge Management Systems: Issues, Challenges and Benefits” organizational culture influences the knowledge management system relatively higher than the organizational structure. They concluded that knowledge users must be involved in not only design part and compulsorily in maintenance part of knowledge management system which will improve the success of knowledge management system. They suggested that to find the difficulties in knowledge management system it is better to ask about the stifling point where they are not coping with the situation. They revealed that the relationship and care with external factors avoids the difficulties in implementing knowledge management systems.

**J. Gretchen Smith et al. (2008)**<sup>1</sup> in their study “Knowledge Management Practices and Challenges in International Networked NGOs: The case of one world international” said that managerial control on style and remuneration for knowledge management system, resources and environmental factors related to its culture act as a major challenges to implement knowledge management systems.

According to **Dr. M. Subba Rao (2012)**<sup>5</sup>, in his article “knowledge management: Some Issues and Challenges for corporate Excellence in the 21<sup>st</sup> century”, understanding of core competencies and its values for their customers is very important for corporate house. He identified that the key challenges for knowledge

management as 1) to make changes in the methods of attracting customers according to internet and E-commerce.2) to transform its processes according to information technology.3) to transfigure the mindset of employees to adopt the knowledge in the organization.

**Manzoor Hashmani et Al. (2016)**<sup>3</sup> in their conference paper “Challenges and benefits of implementing KMS in an IT based company – Case study of Limton Innovative Systems” stated that the following are the some issues faced by the IT Company named Limton Innovative Systems. Information is available freely from many ways which may not be systematic. There is no specific operating procedure which leads to information may not be authenticated. Unclassified data are hard to search and retrieve. Getting approval to retrieve and verify the imperative knowledge should be provisioned in the software. Less attention is paid on employees’ motivation. The open access control which is followed by the company is major threat. Data duplication is another most issue in IT industry.

### OBJECTIVE OF THE STUDY

To explore the problems and difficulties in implementing KM practices with relation to demographical characters of employees.

#### Hypothesis

H0: There is no significant relationship between demographic characters and difficulties in implementing KM practices.

H1: There is significant relationship between demographic characters and difficulties in implementing KM practices.

### DATA ANALYSIS AND INTERPRETATION

Primary data for this study has been collected from assistant and associate professors and professors in engineering colleges in and around Chennai city.

**Table 1: Problems and Difficulties in Implementing Knowledge Management Practices**

S. No.	Criteria	S.A.	A	N	D.A	S.D.A	Weighted Average	Rank
1.	Resistance from the professors	10(50)	20(80)	12(36)	64(128)	26(26)	320	9
2.	Confrontation to take risks	51(255)	57(228)	6(18)	14(28)	4(4)	533	6
3.	Lack of confidence on professors	53(265)	58(232)	6(18)	12(24)	3(3)	542	4

Conted...

4.	Lack of readiness of professors to accept change	44(220)	72(288)	-	16(32)	-	540	5
5.	Absence of proper Performance appraisal System	3(15)	59(236)	18(54)	50(100)	2(2)	407	8
6.	Inappropriate/poor training methods	63(315)	51(204)	8(24)	10(2)	-	545	3
7.	Magnitude of employees	1(5)	3(12)	14(42)	66(132)	48(48)	239	10
8.	Stereotyped performance in the departments	36(180)	76(304)	7(21)	11(22)	2(2)	529	7
9.	Lack of administrative support	48(240)	75(370)	4(12)	3(6)	2(2)	630	1
10.	Lack of transparency	65(325)	53(212)	11(33)	2(4)	1(1)	575	2

Source: Primary Data.

From the above table 1 it has been inferred that Lack of administrative support has scored 630 as weighted average and it has been ranked as the first and foremost difficulty or problem and Lack of Transparency has scored 575 as weighted average and it has been ranked as the second difficulty or problem faced by employees for implementing knowledge management practices in education sector. Resistance from professors and magnitude of employees have been ranked in ninth and tenth position.

### FINDINGS

- 43.2% of respondents were from the age group between 30 and 40 and 40.9% of respondents were between 40 and 50 of age group and 12.9% of respondents were from the age between 20 and 30 and 3% of respondents were above 50 age group.
- 64.4% of respondents were male and 35.6% of respondents were female.
- 80.3% of respondents were married and 17.4 % of respondents were unmarried and 2.3% of respondents were divorced or widowed.
- 72% of respondents were having P.G. qualification and 23.5% of respondents were having Ph.D., qualification and 3.8% of respondents were having only U.G. qualification.
- 36.4% of respondents were having more than 10 years of experience and 32.6% of respondents were between 6 and 10 years of experience and 17.4% of respondents were having 3 to 6 years of experience and 13.6% of respondents were having below three years of experience.

- 40.2% of respondents were from the income group between 20001 and 30000 and 30.3% of respondents were between of 10000 and 20000 income group and 16.7% of respondents were from the income group between 30001 and 40000 and 12.9% of respondents were under the above 40001 income group.

### SUGGESTIONS

- Without administrative support nothing is possible hence organization must understand the importance of knowledge management and should encourage its employees to adopt knowledge management practices.
- Openness will lead to interest among employees. Hence empowerment will be helpful for implementing knowledge management practices.
- Proper training should be given to proper employees at an appropriate time.
- Professors should show their willingness and involvement towards organizations and management should consider involvement of its employees.
- Proper training and explanation about the change should be given to employees to attract them for new implementation.
- Management can give appropriate remuneration to induce risk averters.
- Proper leadership control will eliminate stereotyped performance in the departments. Some employees are not satisfied with existing performance appraisal system. Performance about the employees can be discussed with particular employee confidentially.

- Management should convince their employees by demonstrating about importance of KM practices and its benefits for employees.
- Team work will be helpful for any new implementation.

**Table 2: Over All Relationship Between Demographic Characters and Problems and Difficulties in Implementing Knowledge Management Practices**

**Hypothesis:** There is no significant relationship between demographic characters and difficulties in implementing KM practices.

One way

ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.	Result
Age	Between Groups	4.785	12	.399	.710	.740	N.S.
	Within Groups	66.874	119	.562			
	Total	71.659	131				
Marital status	Between Groups	2.609	12	.217	.994	.459	N.S.
	Within Groups	26.020	119	.219			
	Total	28.629	131				
Qualification	Between Groups	2.223	12	.185	.692	.756	N.S.
	Within Groups	31.838	119	.268			
	Total	34.061	131				
Experience	Between Groups	10.673	12	.889	.805	.644	N.S.
	Within Groups	131.410	119	1.104			
	Total	142.083	131				
Income	Between Groups	13.142	12	1.095	1.134	.339	N.S.
	Within Groups	114.918	119	.966			
	Total	128.061	131				

From the above table 2 significant level of age is 0.740 which is greater than 0.05 and significant level of marital status is 0.459 which is greater than 0.05 and significant level of qualification is 0.756 which is greater than 0.05 and significant level of experience is 0.644 which is greater than 0.05 and significant level of income is 0.339 which is greater than 0.05. Hence Null hypothesis is accepted.

**Result:** Hence there is no significant relationship between demographic characters except gender and difficulties in implementing KM practices.

**Table 3: Relationship between Gender and Problems and Difficulties in Implementing Knowledge Management Practices**

T-Test

One-Sample Test

	Test Value = 2					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Gender	21.968	131	.000	2.038	1.85	2.22

From the above table 3 significant levels is .000 which is less than 0.05. Hence null hypothesis rejected.

**Result:** There is no significant relationship between gender and problems and difficulties in implementing knowledge management practices.

### CONCLUSIONS

A drastic boom in education section sector needs proper acquisition, storage and dissemination of knowledge to serve not only that industry also the country. Identifying and overcoming the difficulties and problems faced by the professors will help the organizations to develop themselves and also employees which will lead to proper implementation of knowledge management practices. Various criteria were given to professors to identify their difficulties on implementing knowledge management practices in which lack of administrative support plays the major role. Hence researcher concluded that support from management will convince the professors for implementing knowledge management practices.

**Ethical Clearance:** Completed

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# A Comprehensive Study on Novel Hybrid Approach for Decision Support System in Disease Diagnosis

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## ABSTRACT

Large quantity of Data Mining techniques have been anticipated through many authors but they are not able to provide better classification. Therefore modifications in the machine learning techniques were made many people in the past which received extraordinary interest in the healthcare sector. Therefore, various combinations of classification techniques, called Hybrid algorithms, were made and achieved a high classification accuracy by the fusion of algorithms and also by the removal of inappropriate attributes. Thus many best hybrid classifiers were made which attracted the attention of many scientists. Even though a good number of hybrid algorithms have been proposed, the hybrid approach given by Sharmila and Vedha Manickam(2016) achieved the highest, 100% accuracy using MRK-SVM hybrid in classifying diabetic dataset. Guvenir and Emeksiz (1998) showed the second level of classification accuracy with 99.25%, using voting feature intervals-5, Nearest Neighbor and Naïve Bayes, during the analysis of erythemato-squamous diseases. Dinesh K.Sharma (2016) also obtained 99.25 % of classification accuracy by using Artificial Neural Network) with Support Vector Machine.

**Keywords:** *Healthcare analytics, Data mining, Hybrid algorithm, Disease Diagnosis, Classification, Attribute selection.*

## INTRODUCTION

Use of computers has generated a huge amount of data in various areas. In health care industry, industry, substantial measure of complex information, identified with the clinical reports, specialist's notes, treatment report, healing facility asset administration records, electronic patient records, drug and wearable body sensors, are being produced. The investigation of medicinal services parameters and the expectation of the resulting future wellbeing conditions are still in the newborn child organize(Sahoo et al. 2017)<sup>1</sup>. This expansion in volume and imprudent association of information, requires manners by which information can be separated and prepared effectively. Extraction of information from Big data has turned into a challenging tasks due to the essentially complex and divided information (Gagan kumar and Rohit Kalra, 2016)<sup>2</sup>. Machine learning techniques form a novel approach to improve their performance through the use of software. These methods have been successfully implemented in various sectors like finance, health care etc. in addition to classification of various diseases in the past (Madhura Rambhajani et al. 2015)<sup>3</sup>.

Diagnosis of life-threatening diseases is a very crucial task in medical treatments. One of the application region of analyzing database and disease findings is the computerized indicative framework to help specialists in settling on precise symptomatic choice for which there is a need to consolidate unmistakable procedures to play out a superior classification<sup>4</sup>.

**Hybrid Algorithm:** Jen et al.(2012) are of the view that all the active traditional Data Mining techniques are not able to execute enhanced analytics in classifying healthcare big data<sup>4</sup>. Since some properties required are not present in a single method, Hybrid Technique is introduced to obtain desired output in classification. In Hybrid algorithm, two prevailing computational insight systems are intergrated adequately to expand into a good classifier enabled by feature selection. The fused hybrid approach carry out both feature selection and data classification<sup>5</sup>. Tan et al. (2009) have depicted that the work process of the cross breed demonstrate contains two principle stages. These wellness esteems are then utilized in the choice of the best arrangement of qualities. After the determination of best arrangement of characteristics, information order is finished utilizing best classifier<sup>6</sup>.

**Feature Selection:** Data pre-processing is a vast advance in the knowledge disclosure process amid information mining, since quality choices depends just on quality information. Subsequently information decrease is connected before mining, which can significantly enhance the general nature of the learning disclosure and quality choices. Mining on the lessened arrangement of characteristics has extra advantages by which it improves the characterization precision and decreases the machine getting the hang of running time<sup>7,8</sup>. Right now, there are three techniques for highlight choice. The primary technique, Filter approach, goes before the genuine arrangement process which is autonomous of the learning calculation. It is computationally basic, quick and versatile. Utilizing channel strategy, include determination is done and afterward the chosen properties are given as contribution to various classifiers<sup>9</sup>. The second one is the Wrapper technique which displays preferable execution over channel strategies in light of the fact that the element choice process is upgraded for the grouping calculation to be utilized. Be that as it may, wrapper strategies are excessively costly for extensive dimensional database regarding computational unpredictability and time<sup>10,11,12</sup>. As of late, a third technique, Embedded strategy has been recommended that endeavour to join the upsides of both past strategies.

**Hybrid approach:** In the recent past, many workers have embraced hybrid approach utilizing different combinations of algorithms and techniques. Many biomedical learning administration, information mining and text mining frameworks receive such a mixture approach. One such prominent methodology is the combination of PSO optimization approach with SVM. It performs improvement first on list of capabilities and afterward classifier SVM is connected to arrange data<sup>13</sup>. In another model, KNN is melded with fluffy rationale to diminish calculation time<sup>14</sup>. Wan et al.(2012) have incorporated K-Nearest Neighbor (KNN) characterization approach with the SVM. This Nearest Neighbor-Support Vector Machine arrangement approach is instituted as half and half SVM-NN<sup>15</sup>. The new hybrid approach, K-SVM achieved the objective of diminishing the size of preparing set and consequently decreasing the preparation and foreseeing time (Yukai Yao et al.)<sup>16</sup>. Ahmad Kazem et al. have executed another novel hybrid approach show utilizing disorderly firefly calculation for securities exchange value anticipating<sup>17</sup>.

Sharmila and Vedha Manickam(2016) have proposed a hybrid model for big data analysis using the classification techniques and clustering to work on Hadoop platform. This hybrid model efficiently predicts the diabetic patients who are having the risk of Cardio Vascular Disease, Nephropathy, or Retinopathy. This prediction enables the patients for the early treatment<sup>18</sup>.

Many systems have been worked to consolidate diverse ways to deal with shape Hybrid strategies. For instance, Mendes et al., (2001) have used fuzzy logic to lead enlistment and hereditary calculations<sup>19</sup>. Genetic algorithms have been combined with neural network by Chen and Kim(1994)<sup>20</sup>. Jerez-Aragones et al.,(2003) combined neural network and decision trees model for prognosis of breast cancer relapse<sup>21</sup>. Sahan et al. (2007) have applied a new hybrid method based on fuzzy-artificial immune system and K-NN algorithm for breast cancer diagnosis<sup>22</sup>.

**Review on Efficiency of Hybrid Algorithms:** In the recent past, heap of works on hybrid algorithms are printed. The comprehensive survey on the potentiality of various hybrid algorithms in the form of percentage of accuracy, has been created. Ubeyli (2009) have used a hybrid technique in that they have combined multiclass SVM with error correcting output code (ECOC) for the identification of erythemato squamous diseases. This model has achieved classification accuracy of 98.32%<sup>23</sup>.

Alaa M. Elsayad (2010) has developed AN ensemble model by combining 3 techniques C5.0, Multilayer perceptron, Linear Discriminant Analysis and achieved 98.23% of accuracy at testing stage<sup>25</sup>. Xie et.al (2011) have rumored a hybrid technique of Support Vector Machine and f score in ordered forward rummage around for medical specialty dataset. During this the initial F-score may be a easy filter technique. With this model they have achieved ninety eight.61% of classification accuracy mistreatment twenty one options<sup>26</sup>. Akin Qzcift et al., (2013) have planned a hybrid technique of genetic algorithmic rule wrapped theorem network Feature choice for Erythemato squamous dataset in that they have achieved 99.20% of classification accuracy<sup>27</sup>.

Mohammad Javed Abdi et.al (2013) have proposed a hybrid method based on particle swarm optimization. The PSO optimization technique blended with SVM to carry out optimization first on feature set and then the

classifier SVM is carried out to separate records. They have additionally proposed an stepped forward hybrid approach based totally on particle swarm optimization, guide vector gadget and association guidelines and acquired ninety eight.91% of class accuracy<sup>28</sup>. Karbatak and Inee (2009) have proposed a hybrid model of affiliation policies (AR) and Neural community(NN) for the classification of dermatology illnesses and received 98.sixty one% of class accuracy.

However, Dinesh K.Sharma have used artificial neural community with support vector machine and acquired 99.25 % of class accuracy<sup>29</sup>.Polat and Gunes (2009) have used C4.5 approach and one in opposition to all, and acquired ninety six.71% of accuracy<sup>30</sup>. Guvenir et.al[1998] have proposed VFI5 for the differential prognosis of erythemato squamous and has acquired 96.25% of type accuracy<sup>31</sup>. Nanni (2006)<sup>32</sup> and, Xie and Wang (2011)<sup>33</sup> both used SVM and characteristic selection strategies. The proposed method accomplished ninety eight.61% classification accuracy. Among all, Guvenir and Emeksiz (2000) had the very best classification accuracy, ninety nine.25%, at the differential diagnosis of erythemato-squamous illnesses the usage of vote casting characteristic intervals-5, Nearest neighbor and Naïve Bayes<sup>34</sup>.

Ubeyli (2008) proposed an automatic analysis device, for detecting breast most cancers based on association rules (AR) and Neural network (NN), in which AR is used for lowering the dimension of breast most cancers database and NN is used for clever type. within the proposed AR + NN gadget, the type accuracy charge is 95 %<sup>35</sup>.

In a observe, Kemal Polat ,SalihGunes (2009) have proposed a unique hybrid category gadget primarily based on C4.five decision tree classifier and one-in opposition to-all approach to categorise the multi-magnificence troubles which include dermatology, picture segmentation, and lymphography datasets taken from gadget studying database. in this work, first of all C4.5 choice tree was run in three instructions of datasets and accomplished 84.forty eight%, 88.79%, and eighty.11% class accuracies for dermatology, photograph segmentation, and lymphography datasets respectively<sup>36</sup>.

Xie et.al (2011) have developed a analysis version based on guide vector machines (SVM) with a novel hybrid feature selection method to diagnose erythemato-

squamous diseases. The experimental consequences display that the proposed SVM-based totally model with IFSFS achieves ninety eight.61% class accuracy the use of 21 capabilities<sup>33</sup>. as a consequence, from the above account, it is clean that the hybrid algorithm executed well and carried out a maximum classification accuracy of 99.25 %.

## DISCUSSION

Extraction of beneficial statistics from large data is possible by using the technique of records mining thru gadget gaining knowledge of techniques. Inside the latest beyond, modification in conventional machine studying procedures has earned brilliant interest in healthcare area. To boom classifier accuracy, unique combination of fusion techniques are employed. within the latest beyond, many researchers have adopted specific hybrid tactics using different mixtures of algorithms and techniques in which powerful computational intelligence strategies are mixed to develop an excellent classifier empowered by feature choice<sup>29</sup>. Ubeyli (2008) have used a hybrid method in which they've mixed multiclass SVM with blunders correcting output code (ECOC) for the analysis of Erythemato squamous sicknesses<sup>35</sup>. KNN is fused with fuzzy logic to decrease computation time. For detection of Parkinsons sickness, fuzzy approaches had been fused with okay-Nearest Neighbour for better category<sup>15</sup>. Similarly Genetic algorithms (fuel) and aid vector machines (SVMs) are integrated successfully by Tan et al. (2009) based on a wrapper method. The effects justify the upgrades inside the type accuracy and exhibit its potential to be an excellent classifier for future records mining purposes<sup>7</sup>. The usage of MRK-SVM algorithm, Sharmila and Vetha manickam (2016) completed the velocity of the processing time<sup>27</sup>.

Asha Gowda Karegowda et.al, (2010 ) have verified that characteristic subset selection is of tremendous significance in the discipline of information mining. real lifestyles facts sets are frequently noisy, making the subsequent facts mining technique difficult, however mining at the reduced set of attributes reduces computation time and category accuracy<sup>37</sup>.

Sahoo et al. (2016) are of the opinion that Cloud-enabled large information analytic platform is the nice way to analyze the dependent and unstructured statistics generated from healthcare management structures. it's far determined that this protocol might be used for

diverse applications related to healthcare and patient tracking along with coronary heart disorder prediction or most cancers severity classification<sup>1</sup>.

## CONCLUSIONS

From the above survey it is concluded that the removal of redundant attributes from the data using the hybrid improves the quality of the data sets and enable a better classification of reduced feature data. From the above survey it is concluded that the proposed hybrid models are able to produce a high classification accuracy due to the removal of redundant attributes from the data and fusion of algorithms. The analysis of the above survey also indicates the viability of the hybrid as a good classifier. Among the various hybrid algorithms put forwarded, the hybrid model given by Sharmila and Vedha Manickam(2016) achieved the highest 100% accuracy using MRK-SVM hybrid in classifying diabetic dataset.

**Ethical Clearance:** Not required

**Source of Funding:** Self

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# Management of Calcific Metamorphosis with Minimally Invasive Porcelain Veneers—A Case Report

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## ABSTRACT

The management of traumatized permanent teeth can present as a significant challenge to the dental practitioner. Calcific metamorphosis occurs commonly in young adults as an end result of trauma. It is usually evident in the anterior region of the mouth and can partially or totally obliterate the pulp space radiographically. Most of the studies and case reports suggest that endodontic therapy is not intervened unless a periapical pathology is detected and/or when the concerned tooth becomes symptomatic. This case report presents the anterior teeth with calcific metamorphosis treated with porcelain veneers.

**Keywords:** Dental trauma, discoloration, calcific metamorphosis, porcelain veneers.

## INTRODUCTION

Calcific Metamorphosis according to American Association of Endodontists is termed as “A pulpal response to trauma characterized by rapid deposition of hard tissue within the canal space.”<sup>1</sup> However, the definition of Calcific Metamorphosis (CM) has been varied among various authors. It can also be mentioned as Canal Obliteration, Dystrophic Calcification, Diffuse Calcification and Calcific Degeneration.<sup>2</sup>

Some have proposed it to be response of pulp to trauma which is detected with hard tissue deposition within the root canal space.<sup>3</sup> Although the exact mechanism of CM remains unclear, but damage to the neurovascular supply of the pulp has been considered to

be the reason for the same.<sup>4</sup> The diagnosis and treatment modalities for teeth with CM are always considered as a controversial issue.<sup>5</sup> This case report describes management of calcific metamorphosis with minimally invasive porcelain veneers.



**Figure 1: Discoloured 11,21**



**Figure 2: IOPA of 11,21 showing calcified canals**

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## CASE REPORT

A 28-year-old male patient reported to the department of conservative dentistry and endodontics with a chief complaint of discolored front teeth and compromising esthetics [Figure 1]. After taking an elaborate history which revealed that the patient had a trauma to the permanent teeth when he was 18-years-old. Clinical intraoral examination revealed discolored upper central incisors. There was no tenderness on percussion. Pulp sensibility tests were performed on 11 and 21. Negative response was reported for thermal and electric pulp testing indicating the non-vital status of the pulp. The intra oral periapical radiographic examination showed calcified canal with respect to 11 and 21 and no abnormality of the hard tissue at the periapical area [Figure 2]. Diagnosis was made as Calcific Metamorphosis with respect to 11 and 21. Treatment was planned after taking various factors into account such as preservation of tooth structure, esthetics, occlusion, and economic status of the patient.



**Figure 3: Veneer preparation 11, 21**



**Figure 4: Cemented veneers on 11 and 21**

During the initial appointment, thorough oral prophylaxis was done. Veneer Preparation was carried out. Deep chamfer finish lines were given using SC850-018, super-coarse, round end taper diamond point

(IQ Dental Supply Inc.). Finish lines were kept at the equigingival level and incisal overlap preparation was done. [Figure 3]. Tooth reduction was done for about 1 mm all around to accommodate ceramic material. Impressions were made using vinyl polysiloxane impression material (Dentsply Caulk, USA). Veneers were prepared using pressable all ceramic material (Cergo Kiss, Dentsply, India). Teeth were polished with pumice and cleaned thoroughly to remove debris, if any. Veneers were checked for occlusion and cemented with resin cement Rely XTM Veneer cement (3M ESPE, Puerto Rico). Crown margins were polished with ceramic polishing kit (Shofu, Inc., Japan). Six months follow-up showed the crown margins are in satisfactory condition [Figure 4].

## DISCUSSION

The end result of the trauma to the primary or permanent teeth results in two common variants of pulpal pathologies which are either calcific metamorphosis or internal resorption. Calcific metamorphosis begins by the activation of odontoblasts. Internal resorption occurs by the excitation of odontoclasts. If the continuous activation of odontoblasts and odontoclasts progresses, the resultant events worsens the situation. In this particular the reversal of the condition took place. The reason for this scenario, may be due to the existence of mother cells for odontoblasts and odontoclasts from the same undifferentiated mesenchymal stock, the odontoblasts idiopathically develop into odontoclasts. Another practical reason for this situation to take place is that eventually to the first phase of trauma exposure that caused calcific metamorphosis, the patient may have undergone another round of trauma which could bring about the excitation of the odontoclastic activity. As the presence of periapical pathologies were not seen radiographically and the patient rendered totally asymptomatic, thus endodontic intervention was not attempted. The patient was kept on observation and ceramic veneers were planned.

The most important factor in the procedure of ceramic veneer in the initial evaluation treatment phase, should involve radiographic and clinical examination, with the purpose of discernment and discovering all the practical etiological factors associated that provoked the darkening of the teeth.<sup>6</sup> When the clinician comes across darkened tooth, at first an IOPAR is recommended to check for the periapical status and any possible signs of resorption process. In this particular case, the history of traumatic exposure in adolescent was a vital tool of

information for the diagnosis and treatment planning. The tooth involved following trauma was totally asymptomatic, however, severe changes in the esthetic appearance occurred resulting in discolored tooth. In a study conducted by Oginni-e- Adekoya-Sofowora et al. (2009), it was found that the teeth involved in trauma, resulted in severe color alteration, usually presented with yellowish discoloration of teeth.<sup>7</sup>

Teeth affected with trauma may demonstrate the periapical changes on radiograph after many years of impact. With regard to this case report, one year follow-up showed signs of complete radiographic obliteration with no changes in the periaex and no painful symptoms. Taking these conditions into account, the involved tooth was not attempted for endodontic therapy due to the complete canal obliteration and the follow-up visits did not result in aggression of the existing problem.<sup>8</sup>

McCabe and Dummer (2012) declared in their study that majority of the teeth (75%) affected with pulp canal obliteration usually remain symptomless and no treatment should be instituted other than monitoring it radiographically. Besides once the endodontic situation is resolved, the esthetic management plays an important role because the yellowing of tooth causes great discomfort for many patients.<sup>9</sup>

Various studies conducted suggested that the treatment administered does not bring about any changes in the properties of the tooth, like morphology, roughness and wear resistance and micro-hardness.<sup>9,10,11</sup> In the clinical case reported, after detailed examination and radiographic modulation, the associated ceramic veneer procedure was done for the treatment of the discolored tooth with calcific metamorphosis. This treatment was rendered effective and met the expectations of both the patient and professionals. The consent was taken from the patient to perform the required procedure and the prognosis of treatment was also informed to the patient. The patient was recalled on periodic follow-ups for clinical and radiographic monitoring, in order to maintain the periapical health, due to the high incidence of recurrence of periapical lesion.

## CONCLUSION

Calcific metamorphosis poses a great challenge to the dentist. Diagnosis and treatment planning for the calcific metamorphosis should be done with precise skill and intervention for successful outcome. This case

report suggests that teeth with calcific metamorphosis can be treated without the intervention of endodontic therapy when periapical pathosis are not present with conservative mode of treatment with ceramic veneers.

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# Performance of Indian Agricultural Export-An Analysis

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## ABSTRACT

The present analytical paper has been written for the awareness on Indian agricultural export and its impact on the GDP growth during the present decade. The authors have identified the volatility during the period of the Indian economy to restore the sustainable portions to be filled by the Indian agricultural export. Neither the national income is highly depended on the service sector or industrial sector. But the agricultural sector is not in a position to restore the 1950-55 situations. The agricultural and extension activities will develop based on human resources and technology, that resources are not utilized properly for the benefit of the people and nations development. The directorate and secretariat for the Department of Agriculture is unable to provide and facilitate the farmers by means of finance, equipments, pesticides, fertilizers, and agro based consultancies to develop the agriculture. The rural and villagers are hesitated to live there duo to poor agricultural employment and income, hence the migration of the people from rural to semi-urban or urban or city are taking place; the generation gap and understanding of the people on the agricultural is merely lower level and otherwise it is depressed job by community and their cost of living. Most of the employees are simply sitting and monthly getting concepts; there is no target of the agricultural process when compared to the other well developed nations. The government data are not updated up to date in its website, due to lack of managerial abilities. Most of the data are hooked up and manipulated to show better through the concern department ministry and officials. Hence, the academicians and scientists are unable to do their research on the agricultural sector. This circumstances are have been prevailing for the past two decades of our Indian economy. Now the politics is renamed as “politico-business” Purchase of Legislative Individuals to Inward Corruption. This is mainly because of the political parties election strategic process, consumption of time to procuring vote, waste of money spent for political agitation activities for the for and against of the ruling parties of state and central. These are done more than the agricultural cultivation process; waste of time and money for the legal formalities to complete the case on willful defaulters regarding misusing government money; and most of the industries are enrooted under corruptions linked with higher officials and politicians. These are the major hindrances of Indian agricultural export is unable to move further after the 70s to 80s. The present paper will implicate the policy makers to what they need to go for the further updating the right data sources to the outside the world.

**Keywords:** *Performance; Indian Agriculture Export*

## INTRODUCTION

Any country's economy, agriculture is considered as backbone. All segments of the society in India are expected the agro food, but now a days the situation is quietly changed into adulteration on agro food due to higher demand of the particular grains/oils/cereals. The marketing system of agricultural products in India is done by both the private and the Government Public Distribution System (PDS). The government has been procuring the agricultural produces from the farmers

through Food Corporation of India (FCI) and the States Civil Supplies Corporations (TNCSC). Most of the States in India, the PDS is done by civil supplies, cooperatives and Self-Help Groups (SHG). The demand of agricultural products of the nation is identified through several organization including organized and unorganized markets, committees and boards are working in zonal, regional and district levels. The growth of agricultural products in India is unsatisfying the demands of population and also the reduction of cultivatable lands into other industrial sectors of the economy is the

another cause of reducing the agricultural productions. As on March 21, 2017 India has 7.68 per cent of entire global agricultural production. GDP of Industry sector is \$495.62 billion and world rank is 12. In Services sector, India world rank is 11 and GDP is \$1185.79 billion. Contribution of Agriculture sector in Indian economy is much higher than world's average (6.1%).

The Indian Gross Value Added (GVA) of Agriculture and allied sector is 23.82 lakh crore INR and its share is only 17.32 per cent. The following figures are portrays Indian economy at present conditions, the GVA growth, GDP sector of economy, agriculture portions on basic value of GVA and GDP growth since 1950.

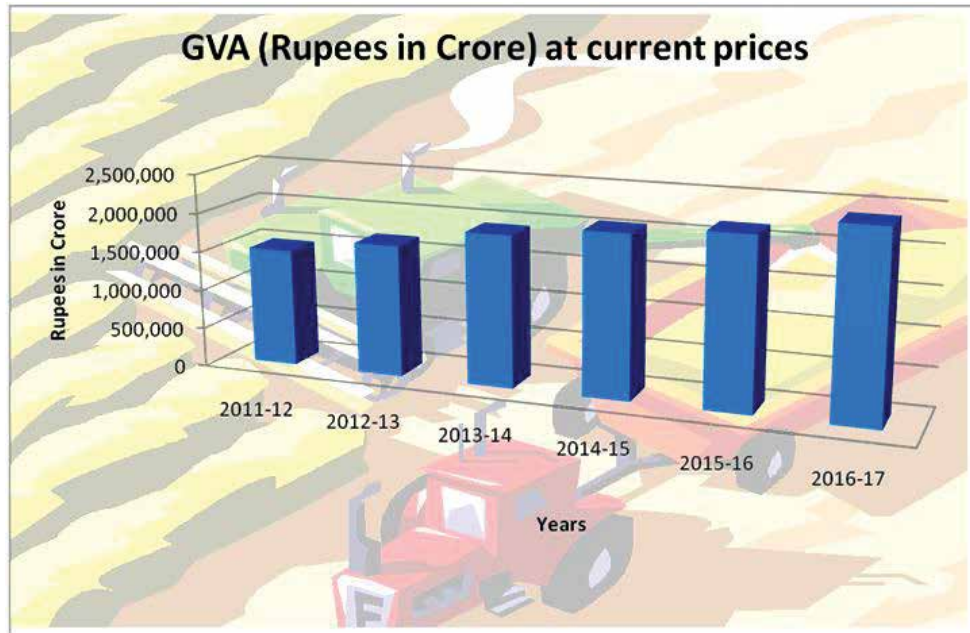


Fig. 1: Agricultural Sector Growth in India

Source: Planning Commission, Government of India (2017)

(Gross Value Added)

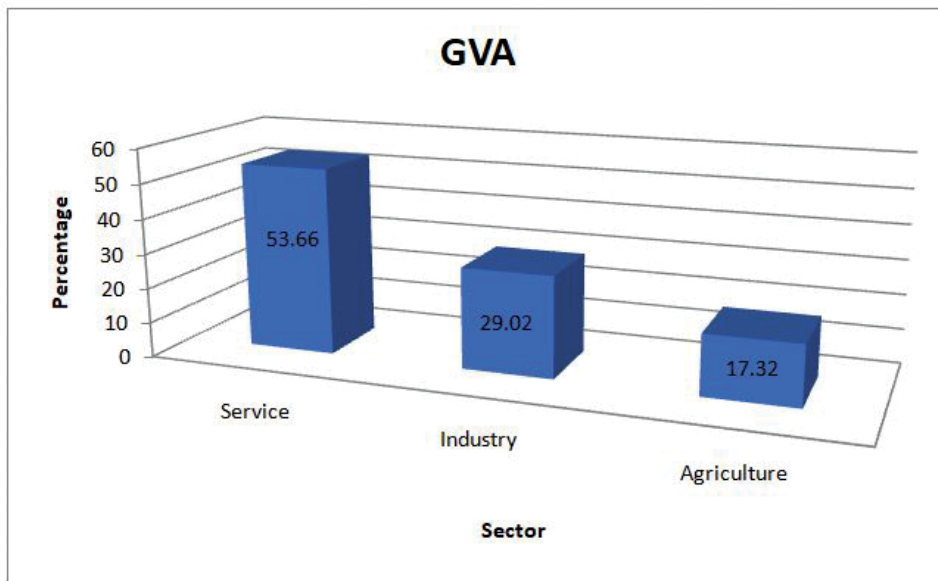


Fig. 2: Indian Economy 2017

Source: Planning Commission, Government of India (2017)

(Gross Value Added)



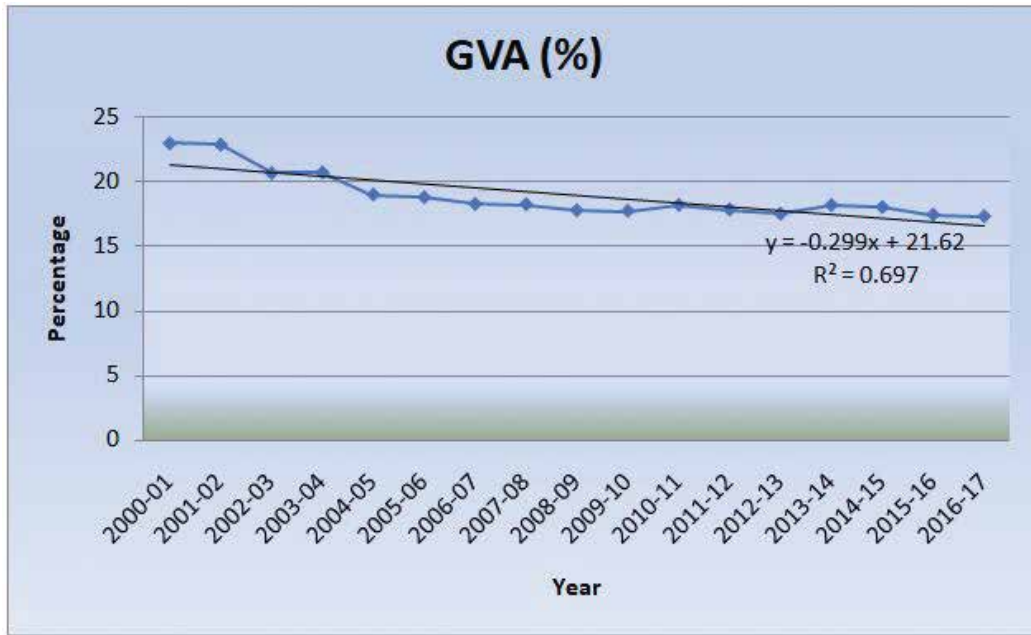


Fig. 3: Agriculture portion on GVA basic value 2000-2017

Source: Planning Commission, Government of India (2017)

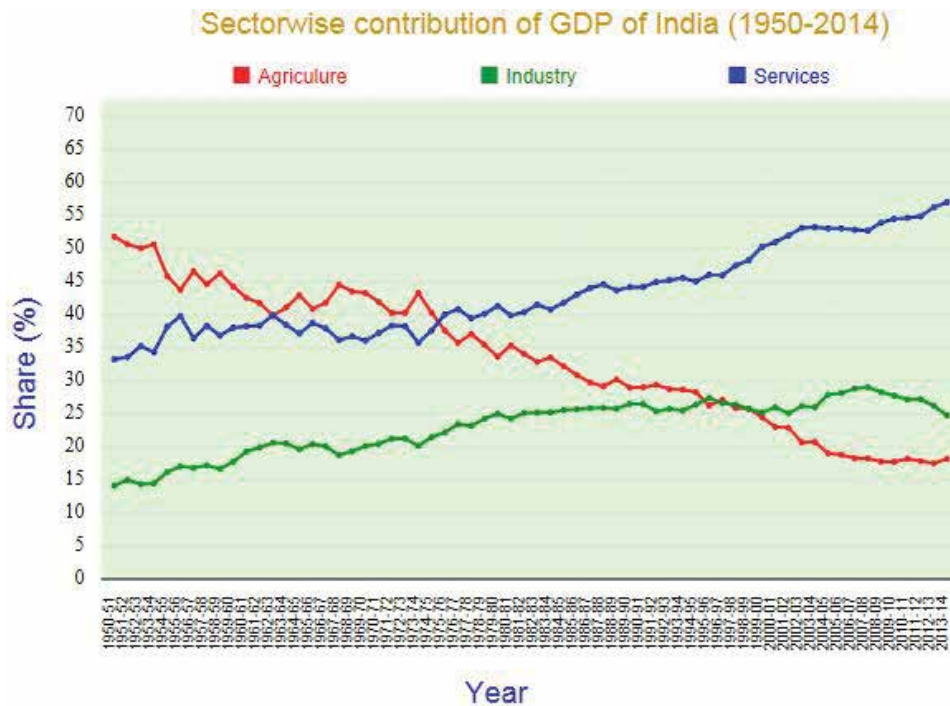


Fig. 4: GDP growth of Indian Economy

Source: Planning Commission, Government of India (2017)

From the above figures authors have been understood that the agriculture sector of India has a down trend from the beginning to at present of Republic India. But the other sector of the economy like industries and services sectors are having the growth trend. The service sector is alone having the significant growth trend during the study period. In the case of industrial sector, it is supposed to recover its previous position or otherwise it seemed as like as agriculture sector of India during 2024. The agriculture export in India is got a significant growth from 2008-09 to 2017-18. It has been evidenced from the following Table No. 1.

**Table 1: Performance of Indian Agriculture Export**

Year	Quantity In Metric Tonne	Value in Rs. Crore
2008-09	13,158,297.09	35,473.94
2009-10	11,264,982.37	35,349.89
2010-11	11,567,531.24	42,437.19
2011-12	19,810,171.89	83,484.32
2012-13	30,172,963.91	118,250.98
2013-14	30,001,581.55	136,921.20
2014-15	27,134,311.45	131,343.05
2015-16	20,469,770.48	107,431.93
2016-17	21,271,453.89	108,426.73
2017-18	22,293,598.89	119,751.74
Mean	20,714,466.28	91,887.10
Std Dev.	7,076,286.52	40,092.03
Co-variance	0.34	0.44
CAGR	8.19	16.32
t-value	2.365	4.16
p-value	0.046	0.003

**Source:** APDEA, [http://agriexchange.apeda.gov.in/indexp/genReport\\_combined.aspx#content](http://agriexchange.apeda.gov.in/indexp/genReport_combined.aspx#content)

From the above table authors have inferred that as per the quantity of exports and gross value of the export in currency Rs in Crore have significantly got its growth (CAGR) 8.19 per cent and 16.32 per cent respectively. The consistency of the growth of the agriculture export is slightly fluctuated after 2013-14. But it has been raised after 2016-17 and recovered the previous position. In future, 2018-19, it may be raised to 24,119,444.64 (MT). Likewise, the value of the export may be Rs.139, 295.22 Crore.

**CONCLUSION**

The authors have taken efforts to identify the outcome of the agricultural exports of the India during 2008-09 to 2017-18 is identically better position. But still it needs

to be leveraged by the initiatives of the both state and central government to increase the agriculture export in all the long-term and short term crops. However, the situations of poor monsoon and natural hazards to the state and central are totally affected. The government has been periodically investigated the agricultural department and they have been generated the statistical figures of the domestic purchase and sales and it also prepared by the district authorities, mostly it has not been giving the actual fact of the agricultural market.

**Ethical Clearance:** Completed

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# An Early Infected Lung Identification and Verification Module Using Neural Classifier

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## ABSTRACT

The objective of the work is to identify the infected lung ailments disorders that influence the lungs, the organs that enable us to inhale the smoke through active and passive smokers and it is the most well-known therapeutic conditions analyzed so far. The diseases, for example, pleural emission and characteristic lung are distinguished and considered in this work. The incentive behind the work is to identify and characterize the lung sicknesses by powerful component extraction through CT image, Arterial blood gases, minute invariants, it include choice through hereditary algorithm and the outcomes are ordered by the Navie Bayes and optimal tree classifiers. The condition classifier strategies will expel the clamors and the element extraction are done to separate the helpful highlights in the lung image and the portion optimal system will enhance the best positioning highlights that are applicable for the lung image and the classifiers are utilized to arrange the image and the execution measures are found for the equivalent image extraction. The consequence demonstrates the optimal tree classifier which brings the effective results with high quality image extraction.

**Keywords:** Arterial Blood Gas, Optimal Tree Classifier, Computed Tomography

## INTRODUCTION

In the recent past day's lung infection and related disease are the most common disease found in human physique. The survey expellees that the Computed Tomography (CT) is the most as of late utilized indicative imaging examination for chest infections, for example, lung malignant growth, tuberculosis, pneumonia, and aspiratory emphysema. A review result uncover reality that more than 10 million individuals worldwide die annually from chest related diseases <sup>[1]</sup>. Similarly the most common lung infection was found that out of all lung Cancer is the main cause of mortality worldwide amongst all types of lung infections. Main reason behind high rate of mortality due to lung cancer is that it is not easily detected in the initial stage and it is very difficult to overcome this disease at later stages of cancer<sup>[2]</sup>. If lung lumps can be identified precisely at an early stage, the patient's survival rate can be increased

by a significant percentage. In the recent days, the field of automated diagnostic systems plays crucial role in the diagnosis of any disease. Image Processing is one such field where automated diagnostic system designed especially for medical diagnosis leads to solution which will help in decreasing the mortality rate and these medical diagnostics systems helps in detecting the disease at initial filed which significant in the field of bioinformatics<sup>[3]</sup>. Correspondingly a method based upon the, Gabor filtering to extract texture features, from the infected image results, the accuracy of delimitation was seen to be above 95%. The accuracy of image pattern is diagnosing the segmented regions automatically, an average sensitivity of 91.05% was attained by conjoining, shape position-based features and cortex-like feature in a Simple tree classifier. The quantity of images to be examined is at an riotous level, especially in populated countries with infrequent medical professionals. While examine the X ray image by the radiologists, they need to recognize the two lungs and then find any obvious abnormality <sup>[4]</sup>. An infected lung can cause a disease of atypical cells swelling and growing into a tumor. Cancer cells can be conceded away from the lungs in blood, or lymph liquefied that ambiances lung tissue.

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Lymph drifts through lymphatic vessels, which groove into lymph nodes positioned in the lungs and in the Centre of the chest. Lung cancer habitually spreads toward the Centre of the chest since the usual flow of lymph out of the lungs is in the direction of the Centre of the chest. Metastasis occurs when a cancer cell greeneries the site where it initiated and moves into a lymph node or to every part of the body over and done with the blood stream<sup>[5]</sup>. There are three main types of lung cancer specifically small cell lung cancer, Non- small cell lung cancer and lung carcinoid tumour. Non-small cell type of lung cancer is considerably more common than small cell lung cancer<sup>[6]</sup>. The Most well-known instances of lung disease are a result of smoking. Lung growth is one of the main sources of death for a large portion of the patients enduring with lung disease, there are no treatments available currently for curing cancer. However there are number of diagnostic tests available for detecting cancer like sputum testing, Bronchoscopy, Needle biopsy and thoracentesis tests are very painful which requires physical contact with the body. So to avoid these painful test methods segmentation can be done for the obtained CT image of the patient <sup>[7, 8]</sup>. Relevant works on lung disease also focused on Lung segmentation which performed on number of methods like thresholding based methods where grayscale input image is converted to bi-level image by either of two available thresholding algorithms namely Global thresholding type algorithm and Local/adaptive type thresholding algorithms but the drawback of this method is it doesn't work good with attenuation variations and it is not good in pathologic classification<sup>[9]</sup>.

As far as image classification technique the controlled classification technique involves the preparation statistics set in order to communicate the classifier to define the verdict lung nodule boundary. It identifies the illustration of the required information in the image, which are known as grey value sets <sup>[10]</sup>. This is then used to enlarge a statistical sketch for the reflectance of information for each set, which is known as 'Signature Analysis'. The last step is to classify the image by searching the reflectance for each pixel and evaluating the resemblance to the signatures.

**Infected lung nodule identification module:** Lung nodule is similarly termed a spot on lung respiratory nodule. It is typically outlined in round or oval in nature. It is usually very are easy to discover however it is very hard to diagnose. An infected lung nodules are found frequently 1out of every 6 chest CT scans. In order to find the sequential benign of infected lung nodules which can be caused by earlier infections or old surgical treatment scars.

Every time a nodules need to be observed and inspected meticulously because there might be a small infection which causes cancer. Discovering it early when it is in minimum size is curable but it is very difficult to notice. Inappropriately humans with maximum size lung cancer consume a lesser persistence rate. An early detection is possible with powerful component extraction through CT image and its classified output by implementing in hereditary algorithm as shown in figure 1.

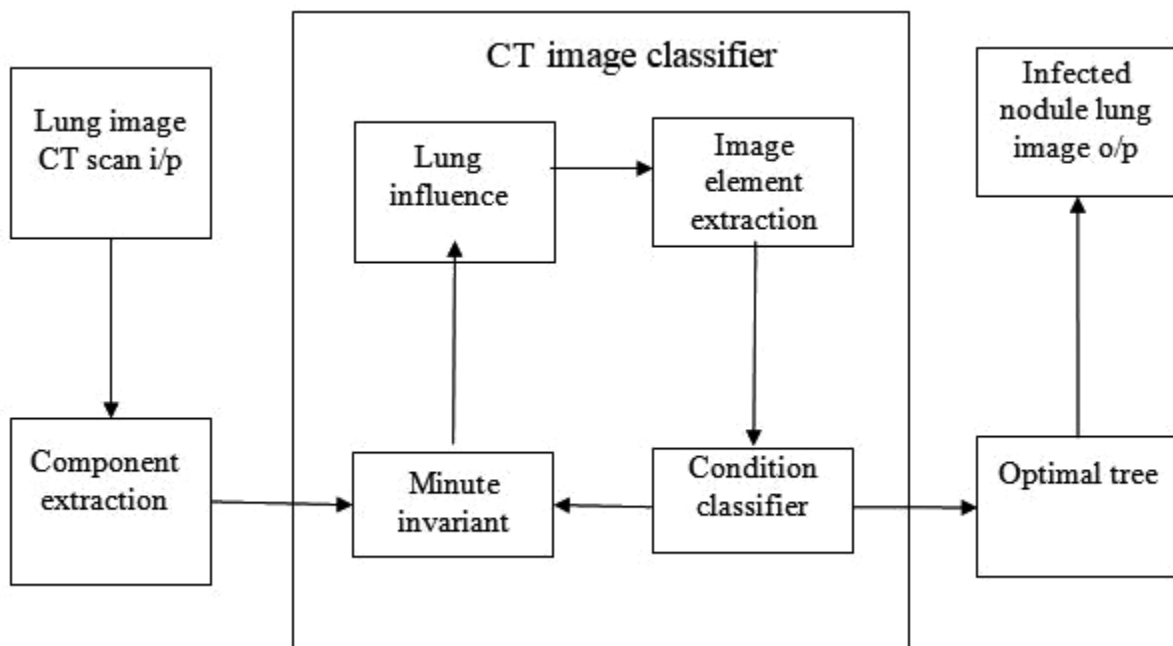


Figure 1: Infected lung influence and its optimal image extraction

The extraction procedure of the respiratory parenchyma can be delimited by eradicating the circumstantial as an initial finding, that the image with the same grey level as the lungs but positioned external part of chest from the image to avoid misperception. Initially the input of CT scan has been mounted to find the compound image extraction. The sequence continues to extract the exact lung influence for infected element in lung with condition classifier to check the gray scale image resolution. If the gray scale image resolution found to be better than the existing input then the image extraction are tested with optimal tree in various aspects. This is projected, due to the high correspondence amongst the grey intensities of the lungs and the image background, which cannot be just applied by using a thresholding technique. As an alternative minute variant, preliminary starts from the four turnings of the image, moves laterally from four directions recognizing as background pixels, those pixels whose grey level is within a pre-fixed range.

#### Lung Image Extraction with Optimal Image Classifier:

The extraction methodology in image classifier with original CT lung image are implemented in compound extraction. The optimal classifier are focused in image and its pixel value with original vale and extracted value with respect to gray scale. Uncertainty of the pixels consume values within the assortment then equally these pixels and the output then it marked as contextual pixels and the examination energies to be constant. If not, the X-ray is sporadic along to track under the image inspection and the consecutive row where the specific column are analyzed and it will continue in a comparable technique. These images produced by the classifier are transformed to binary descriptions by means of some detailed performance like Thresholding technique that uses whichever is changeable or non-changeable threshold be contingent on the lung region with non-removable background images. As shown in figure 2a representing lung image with background and 2b with threshold dispensation.



Figure 2a: Lung image with background



Figure 2b: Lung image with threshold dispensation

The most specific terms of image extraction are explicitly, after removing the major few original and previous portions of a CT scan that do not comprehend lung images that enduring portions are categorized into different sectors conforming to the superior, internal and inferior portions of the lung size. In order to focus on the sets of the lung image signifies a slighter proportion are infected than in the subsequent lung set as shown in figure 2a and 2b respectively. Consequently a dissimilar thresholding method is functional contingent on the sets of lungs which is specified portion fits to it. Through by using a dynamic threshold an infected point of lung is exactly identified through an iterative technique which is specifically done in the portion of the lung, a threshold value show casts its originally determined for all part of the lungs.

Flow of image extraction and granular identification,

*Lung image* → *Nodule Point* → *Specific location*

*Lung background removal* → *Non-linear abstraction*  
→ *Blurred image*

*Lung threshold dispensation* → *linear abstraction*  
→ *Infected image identification.*

*Dynamic threshold* → *significantly infected lung portions as output*

#### Image classification using fuzzy C-means clustering algorithm:

The progression of categorizing image into predetermined set of individual portions based on their data values can be applied through classification. The pixel is assigned to a particular sets in lungs, if it fulfils the convinced infected image as an output to fit in a particular class. The image classes can be recognized or indefinite. If the exact image nodule center is able to separate the modules based on the training data, then the modules are recognized, else they are indefinite. Similarly the image classification techniques can

be considered as parametric and non-parametric, or managed and unsubstantiated or neural classifiers. An image categorization are been implemented to find the exact nodule center for infected image using C-means clustering algorithm where  $V_{ii}$  noted as image validation to measure boundary points with initial value  $K$ . Inner layer visualization end points are represented as  $X_i$  with respect to  $C_{j,k}$  with  $N$  number of image input verification,  $M$  module validation matrix as shown in equation 1.

Image classification vectors initialization,

$$v_{ii} = \frac{1}{\sum_{k=1}^c \left[ \frac{x_i - c_j}{x_i - c_k} \right]} 2 / m - 1 \quad \dots(1)$$

$$c_j = \frac{\sum_{i=1}^n v_{ij} - xi}{\sum_{i=1}^n v_{ij}^m} \quad \dots(2)$$

Then C-means clustering image verification (V) and validation matrix (M) vector algorithm implemented as follows,

**Step 1:** Initialize image verification input as V

Where  $V = [V_{ii}]$  with matrix,  $M^{(0)}$

**Step 2:** To calculate center image vectors initialize K

$C^{(k)} = [C_j]$  with  $V^k$  :// ( nodule image boundary)

$$v_{ii} = \frac{1}{\sum_{k=1}^c \left[ \frac{x_i - c_j}{x_i - c_k} \right]} 2 / m - 1$$

**Mat-lab code for image segmentation and to identify infected lung:**

```

Binary Image (:1) = true;
Binary Image (: end) = true;
Binary Image (1 :) = true;
Binary Image (end, :) = true;
// the province between the border of lungs
Binary image = imfill(binary image, 'dumps');
// imclear border to produce clear and consent in the lung boundaries
Binary image = imclear border (binary image);
// to grow the lungs filled.
Lungs mask = imfill (binary image, 'dumps');
    
```

**Step 3:** Concatenate the updated value with one other  $V^{(k)}, V^{(k+1)}$

$$V_{ii} = c_j = \frac{\sum_{i=1}^n v_{ij} - xi}{\sum_{i=1}^n v_{ij}^m}$$

**Step 4:** If image validation model M doesn't reflects then

If  $\| V^{(k+1)} + V^{(k)} \| > \sum$  then start //

(Where  $\sum$  dissolution image condition more than 1)//

**Step 5:** If image validation module M and verification representation applies

Where  $\| V^{(k+1)} - V^{(k)} \| < \sum$  then stop

// (Where  $\sum$  dissolution image condition between 0&1)//

Else return to step 2

**Step 6:** End if condition satisfied

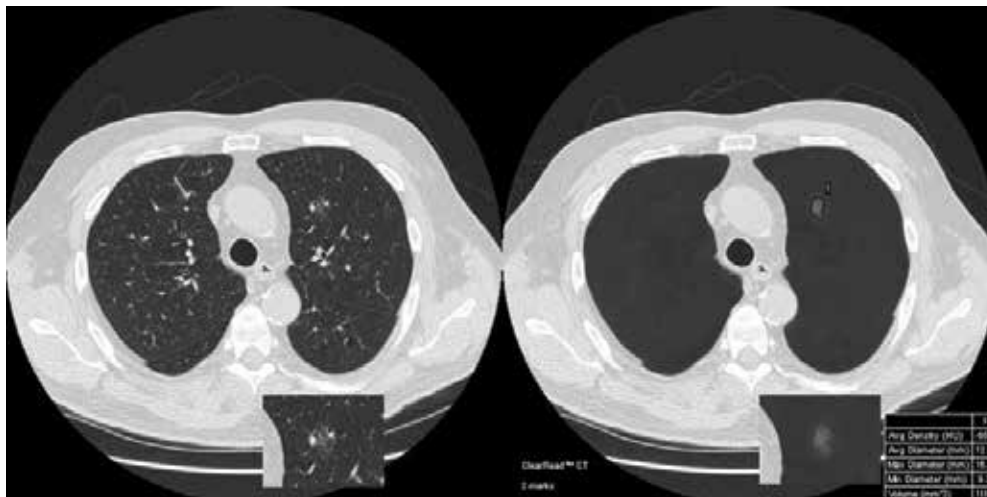
**Lung image segmentation methodology:** Segmentation of an image involves the separation of lung nodule from other part of the CT scan images and then enhancement of the resultant image to get details. This procedure includes sequence of steps to find image segmentation and infected part of lungs. Basically it includes an input image which is transformed to gray image and non-local mean filter is applied to remove Gaussian noise where threshold values are used with mat lab code for infected lung from lung CT scan image as shown below,

```

I=dicomread('F:\DOI\LIDC-IDRI-00001\1.4.7.1.5.1.12513.5.2.1.6279.6001.298806137288633453246975630178\
1.3.6.1.4.1.14519.5.2.1.6279.6001.179049373636438705059720603192\000003.dcm');
Info = dicominfo('F:\DOI\LIDC-IDRI 0001\1.5.6.1.4.1.14519.5.2.1.6279.6001.2988061372886334
53246975630178\1.3.6.1.4.1.14519.5.2.1.6279.6001.179049373636438705059720603192\000003.dcm');
I=dicomread(info);
Imshow(I,'Show volume',[,]);
Title('original image');
% image_gray=rgb2gray(j);
image_resize=imresize(I,[256 256]);
image_resize=im2double(image_resize);
%clarifying
% B=medfilt2(j,[8 8],'symmetric');
% figure,imshow(B);
gamma=0.2;%aspect ratio
psi=0;%phase
theta=40;%orientation
bw=3.5;
lambda=3;%wavelength
pi=180;
for x=1:246
for y=1:246
x_theta=image_resize(x,y)*cos(theta)+image_resize(x,y)*sin(theta);
y_theta=image_resize(x,y)*sin(theta)+image_resize(x,y)*cos(theta);
gb(x,y)=exp(-(x_theta.^2/2*bw^2+gamma^2*y_theta.^2/2*bw^2))
*cos(2*pi/lambda*x_theta+psi);
end
end

```

**Infected lung hole identification output:**



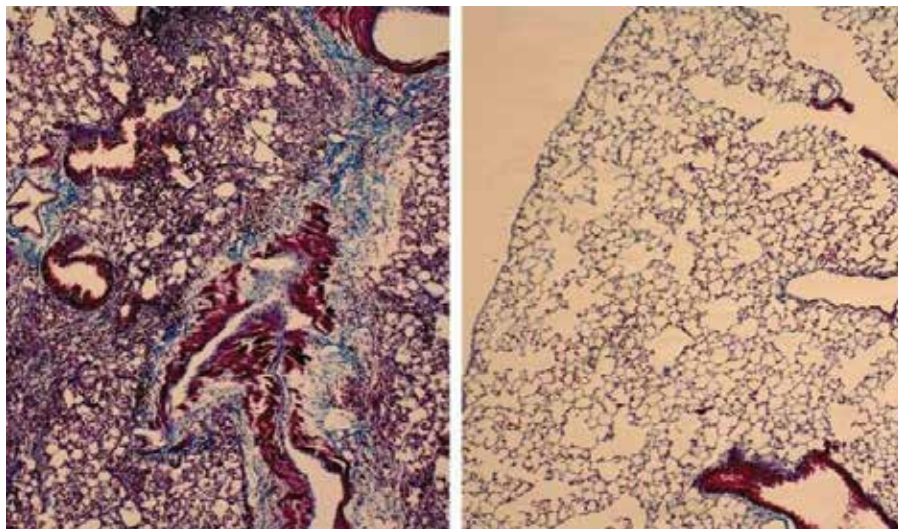
**Figure 3: Mat-lab code execution for infected lung hole segmentation and identification**

**Finding lung infection through alveolar wall:**

Initial finding in infected sector is based on the image preprocessing technique the optimal classifier optimized with various images extracted as a sample data/images with respect to image moderation and reflection. The principal function of the lung alveolar is gas alteration. It is consequently always unprotected to the smoky situation counting particulate biological substantial sequence, such as bacteria, viruses and microorganisms in internal position of lung. Even though the complete lung tract is frequently exposed to air intake, mainstream of elements are filtered out in the proboscis. In epiglottis most of the sequence its closure impulse and the cough impulse are will reduce the risk of microorganisms reaching the lower lung region. Elements are insignificant to reach the trachea and bronchi stick to the lung secretion lining on alveolar walls and also impelled in the direction of oropharynx by the action of mucociliary escalator. Based on the present scenario infected position of lungs can be visibly identified with respect to increase in wall thickening in internal alveolar of lungs (thickening of the alveolar walls (left) (decreased thickness of alveolar walls (right) with various aspects as shown in figure 3.

Notwithstanding superior filtration capability of N95 filtering facepiece respirators measured in vitro, unsatisfactory medical evidence has been published to determine whether normal surgical masks and N95 filtering facepiece respirators are equivalent with respect to preventing respiratory infections in healthcare workers. An early detection may save numerous humans from the source of death and it is identical imperative to know the symptoms which is related to lung infection caused namely,

1. Recognize which geographies indicate that explicit area of the lung tract is infected
2. Distinguish in what way to consider breathing negotiation
3. Identify how to recognize the pathogen.
4. Distinguish the major infections of the breathing tract
5. Identify the influences subsidizing to their incidence
6. Recognize the basis features of lung medical organization.



**Figure 4: Early detection beside infected lung (thickening of the alveolar walls (left) (decreased thickness of alveolar walls (right)**

**CONCLUSION**

An image enhancement and performance technique is developed for earlier stage in infected lung and its recovery procedures. The time period influence remained to find the sequence of anomaly issues in lung images. The essential features of this work is to identify and find lung infection through alveolar wall and

the quality image using optimal tree classifier. The accuracy is absolutely clear in different stages of image quality assessment as well as enhancement stage where it is adopted on low pre-processing techniques based on fuzzy c-means algorithm.

The proposed technique is well-organized with respect to infected lung image identification and

segmentation principles with various input images and classification procedures for future image extraction finding. The motivation behind the work is to identify and characterize the lung sicknesses by powerful component extraction through CT image through hereditary algorithm and the outcomes are ordered by the Navie Bayes. The methods and technique used in this work produces an identical and auspicious results in early detection on infected lungs comparing with existing methodologies.

**Ethical Clearance:** VISTAS

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Assessment of Inflammatory Markers in Hemolytic Crisis with Special Reference to Sickle Cell Anemia

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## ABSTRACT

As a global health problem sickle cell anemia affects many world populations. It is an autosomal recessive disease, commonly found in tropical countries. It is the most common single genetic mutation in human and abundantly present in large part of the world. The present study was done in the Department of Biochemistry, Chhattisgarh Institute of Medical Sciences, Bilaspur. The work comprised of two different groups consisting 50 sickle cell patients with hyperhemolytic crisis, including 50 age and sex matched control subject. In the present study namely, Homosysteine, IL-6, TNF- $\alpha$ , and CRP as an inflammatory markers measured in normal and sickle cell disease patients. We found significantly increased mean level of all three parameters (IL – 6 Group I V/s Group II  $p < 0.001$ , TNF- $\alpha$  Group I V/s Group II  $p < 0.001$ , CRP Group I V/s Group II  $p < 0.001$ ). when compared to control and subject group.

**Keywords:** Sickle Cell Anaemia, Hemolytic Crisis, Inflammatory markers.

## INTRODUCTION

Millions of people worldwide affected by sickle cell disease, the most commonly observed Hemoglobinopathy poses significant challenges for clinician and scientist. Treatments for the symptoms and complication of the condition are available, but in most cases there is no cure.

It is an autosomal recessive disease, commonly found in tropical countries. It is the most common single genetic mutation in human and abundantly present in large part of the world i.e. Africa, Mediterranean countries, Middle East and parts of South American countries, India and others parts of the globe where people originating from these countries have settled. In India the Sickle Cell belonging to the same haplotype and is stated to have evolved independency. Clinical and hematological also the sickle cell disease prevalence in

India is deferent from the rest of the world<sup>1</sup>. Four major types of crises are recognized in sickle cell anaemia: aplastic, acute sequestration, hyper-haemolytic, and vaso-occlusive crises. Hyperhemolytic crisis to be a major problem among patients with sickle cell anaemia where the natural history of the disease is somewhat complicated with recurrent episodes of malarial infection<sup>3,4</sup>. Hyperhemolytic Crisis is a term used to describe the occurrence of episodes of accelerated hemolysis characterized by decreased blood hemoglobin, increasing reticulocytes, and other markers of hemolysis like hyperbilirubinemia, increased LDH.

Several cytokines and tumor necrosis factor-alpha (TNF- $\alpha$ ), are associated with the activation of leukocytes, particularly monocytes and neutrophils in SCA. Several other cytokines are also involved in the chronic inflammatory state that is present in SCA.<sup>4</sup> Recently, the involvement of several other cytokines, such as IL-18, IL-17, IL-23, IL-12 and IL10, in inflammatory responses in SCA patients has been described.<sup>5,6</sup>

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## MATERIAL METHOD

The present work was done in Dept. of Biochemistry at Chhattisgarh Institute of Medical Sciences, Bilaspur.



The study included 50 subjects with Homozygous Sickle cell Disease (Hb SS), and 50 age matched healthy controls (Hb AA). Informed consent was taken from all the subjects, in case of children, the filled informed consent was taken from their parents. Hyper-haemolytic crisis was defined as significant change in blood picture characterised by a precipitous fall in the haemoglobin level associated with jaundice, marked reticulocytosis, and polychromasia on the blood smear, increased unconjugated hyperbilirubinaemia, and increased urobilinogen content in urine above the steady state level for each individual patient. Inclusion criteria includes Subjects with sickle cell disease, who were confirmed by solubility test and then Cellulose Acetate Electrophoresis.

All subjects aged between 0 years to 20 years of both male and female. Patients with splenic sequestration crisis, transfused blood within last 3 months, steroidal and anti inflammatory drug therapy, UTI, all paediatric patients with sickle cell anaemia (Hb SS) who showed features consistent with hypersplenism were excluded. First Solubility test followed by Electrophoresis was done for identification of SCD. All routine biochemical and hematological tests were done by biochemical and hematological Auto analyzers respectively. CRP, IL-6, TNF and Homocysteine were estimated by enzyme immunoassay. Data were presented within lower and higher ranges with standard deviation.

## RESULTS

**Table 01: Values of Inflammatory Markers in Control**

[Total 50 (26 Male, 24 Female)]

Sl. No.	Parameter	Range	Mean $\pm$ SD
1.	CRP	0.40–4.20	1.78 $\pm$ 0.91
2.	IL-6	74.87–107.45	89.94 $\pm$ 9.26
3.	Homocystein	4.50–12.40	6.99 $\pm$ 1.78
4.	TNF- $\alpha$	50.56–85.78	71.62 $\pm$ 7.48

**Subjects with Hyperhemolytic Crisis:** Total 50 subjects (28 Male, 22 Female) were included in this group who were suffering from SCD with hyper hemolytic crises. The observation seen in this group are depicted below:

**Table 02: Values of Inflammatory Markers in Group - II (SCD with Hemolytic Crisis)**

Sl. No.	Parameter	Range	Mean $\pm$ SD
1.	CR-P	90.00 – 130.00	114.02 $\pm$ 9.76
2.	IL-6	120.00 – 280.00	204.28 $\pm$ 49.39
3.	Homocystein	13.87 – 32.68	26.13 $\pm$ 4.42
4.	TNF- $\alpha$	64.00 – 93.00	81.96 $\pm$ 7.12

**Table 03: Comparison between study groups**

Sl. No.	Parameter	Normal Mean $\pm$ SD	Hemolytic Crisis Mean $\pm$ SD	P-Value
1.	CR-P	1.78 $\pm$ 0.91	114.02 $\pm$ 9.76	<0.001
2.	IL-6	89.94 $\pm$ 9.26	204.28 $\pm$ 49.39	<0.001
3.	Homocystein	6.99 $\pm$ 1.78	26.13 $\pm$ 4.42	<0.001
4.	TNF- $\alpha$	71.62 $\pm$ 7.48	81.96 $\pm$ 7.12	<0.001

In the present study Proinflammatory cytokine levels in serum, namely, IL-6, TNF- $\alpha$ , and CRP with homocysteine as a inflammatory marker measured in normal and sickle cell disease patients. We found significantly increased mean

level of all three parameters when compared to control and within the sub groups (IL – 6 Group I V/s Group II p <0.001, TNF- $\alpha$  Group I V/s Group II p < 0.001, and homocysteine Group I V/s Group II p <0.001 ).

## DISCUSSION

In the present study Proinflammatory cytokine levels in serum, namely, IL-6, TNF- $\alpha$ , and CRP as a inflammatory marker measured in normal and sickle cell disease patients. We found significantly increased mean level of all three parameters when compared to control and within the sub groups (IL – 6 Group I V/s Group II p <0.001, TNF- $\alpha$  Group I V/s Group II p < 0.001, CRP Group I V/s Group II p <0.001).

Many other studies including Crpziat et al<sup>7</sup>, Taylor SC et al<sup>8</sup>, Bourantas KL<sup>9</sup> Raghupathy R et al<sup>10</sup> have shown increased levels of cytokines in serum even during the steady state of SCD. It is believed that there are significant subclinical microvascular occlusions in steady state due to ongoing local tissue ischemia with necrosis. It is now clear that local patterns of cytokine regulate lymphocyte effectors mechanisms<sup>11</sup>. It is postulated that the rise in the acute-phase proteins minimizes tissue damage caused by the microvascular infarctions. Increased levels of acute-phase proteins in plasma have been reported even during the steady state of SCD<sup>7, 12-15</sup>. In our study, we observed that. Serum levels of CRP increase when the inflammatory stimulus is of low-grade intensity and of short duration, such as the subclinical microvascular occlusions in steady state. This process is further augmented in crisis. In the positive agreement with Lowenthal et al<sup>16</sup>, the present study we also found significantly increased level of homocystein when compared to control subject. It is known that patients with sickle cell disease present activation of the blood coagulation and fibrinolytic systems, especially during vaso-occlusive crises, but also during the steady state of the disease<sup>17</sup>. Due to decreased erythrocyte half-life, individuals with homozygous sickle cell disease have increased erythropoietic demands for folate. Subjects with inadequate folate status might be expected to manifest higher blood levels of homocysteine. It is possible therefore that raised homocysteine levels in SS disease predispose to the development of thrombosis through inhibition of the protein C anticoagulant pathway.

## CONCLUSION

Both extravascular and intravascular hemolysis appears to contribute to the pathogenesis of hemolytic anemia in sickle cell disease, although the precise contribution of each has not been defined. we report here that SCD patients showed a significant elevation in TNF- $\alpha$ , IL-6, CRP and homocystein in anemic crisis state, when compared to normal controls.

**Ethical Clearance:** Taken from Institutional Ethical committee

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Correlation of Foot Length and Gestational Maturity in Neonates—A Study from Coastal Karnataka

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## ABSTRACT

**Introduction:** The degree of maturity is a major contributor to neonatal mortality and morbidity. Early identification of preterm babies can prevent life-threatening complications. This study was carried out to determine whether postnatal foot length could accurately identify the gestational age in a specified South Indian neonatal population.

**Material and Method:** This hospital-based cross-sectional study included 320 neonates within 72 hours of life. The study was approved by the Institutional ethics committee. After obtaining the informed consent, neonatal foot length was measured using a sliding plastic Vernier caliper. Neonatal anthropometric parameters like weight, crown-heel length, head circumference were also recorded. The data were analysed using SPSS version 11.5.

**Results:** In preterm neonates correlation of foot length with weight, head circumference, crown-heel length and gestational age by Ballard's score were statistically significant. From receiver operating characteristic curve, cut off value obtained for prediction of prematurity was 7.35cm which had sensitivity and specificity of 80% and 78 % respectively.

**Conclusion:** Neonatal foot length can be a good surrogate measure in predicting prematurity

**Keywords:** neonate, prematurity, foot length

## INTRODUCTION

Neonatal period is a major determinant for morbidity and mortality in childhood. As per Global health observatory data, neonatal deaths contribute to 45% of all the under-five deaths<sup>1</sup>. Prematurity, sepsis, and birth asphyxia are the leading causes of neonatal mortality worldwide<sup>1</sup>. The degree of maturity is a major contributor to neonatal mortality and morbidity<sup>2</sup>. Early identification of immaturity among babies is therefore of paramount

importance to prevent life-threatening complications<sup>3</sup>. Neonatal units in developing countries may use last menstrual period method or neonatal scores to assess neonatal maturity, however; both of these methods are inaccurate<sup>2</sup>. Hence, there is a need for an alternative method, which can predict birth weight and gestational age. This measurement should be simple, reliable, have good correlation with birth weight and gestational age. This study was carried out to determine whether postnatal foot length could accurately identify the gestational age in a specified South Indian neonatal population.

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## MATERIAL AND METHOD

This cross-sectional study was conducted in the tertiary care teaching hospitals affiliated to Kasturba Medical College (Manipal Academy of Higher Education) Mangalore, a Coastal city in Southern India, between August and October 2017. Approval

was obtained from the Institutional Ethics Committee (IEC) of Kasturba Medical College, Mangalore after which permission was obtained from the Authorities of concerned hospitals for conduction of the study. Three hundred and twenty inborn neonates aged less than 72 hours, who were admitted in the study hospitals during the study period were included in the study. Babies with skeletal deformities of the foot and babies whose maternal last menstrual period date was unknown were excluded. During the study, study objective/ purpose was explained to the mothers of the babies in a language known to them. After obtaining their written informed consent, a semi-structured proforma with demographic details, maternal last menstrual period date, date of birth of the neonate, etc. were filled, and physical examination was conducted by the investigator. Based on gestational age, babies were grouped as preterm and term babies. Following anthropometric measurements were recorded – foot length, crown-heel length, and weight, head circumference, and gestational age. Foot length was measured with a plastic Vernier's sliding caliper. The measurement was taken within 72 hours of postnatal age. The neonatal foot was estimated from the midpoint of the heel to longest toe. The heel was placed against the platform, the sliding bar of the caliper was moved until it came in contact with the tip of the big toe. The scale was read after withdrawing the instrument. Crown-heel length was measured using an infantometer, weight of the baby was measured using an electronic weighing scale, gestational age assessment was done using modified Ballard's scoring and maternal Last menstrual period. Babies were classified into preterm and term babies. Head circumference was measured using a non-stretchable measuring tape

The collected data were coded and entered into Statistical Package for Social Sciences 11.5 (SPSS Inc., Chicago, Ill., USA). Results were expressed as mean with standard deviation, median with interquartile ranges and percentages using appropriate tables. Receiver Operating Characteristic (ROC) curve was generated with neonatal foot length as a test variable to predict preterm births. Optimum cut off value was obtained from the ROC curve. Sensitivity, specificity, positive predictive value and negative predictive value were calculated for the cutoff score. Pearson, correlation coefficient test, was used to determine the relation of neonatal foot length with anthropometric parameters like weight, crown-heel length, head circumference.  $p < 0.05$  was considered as statistically significant.

## RESULTS

Out of 320 babies, 159 were male (49.7%), and 161 were female (50.3%). In this study 264 (82.5%) babies were term and 56 (17.5%) were preterm. Table 1 depicts the median with interquartile values of foot length of the neonates as per their gestational age. Comparison of the median and interquartile values of foot length, head circumference, crown-heel length, weight and gestational age by Ballard's score between the preterm and term neonates is presented in Table 2. The difference in the values is statistically significant.

Correlation of neonatal anthropometric parameters with foot length among preterm and term neonates is depicted in Table 3. In preterm neonates correlation of foot length with weight, head circumference, crown-heel length and gestational age by Ballard's score were statistically significant whereas in term neonates statistically significant association of foot length was found with weight and head circumference.

Receiver Operating Characteristic (ROC) curve generated with neonatal foot length as a test variable to predict prematurity is shown in Fig 1. The area under the ROC curve was 0.772. Optimum cut off value obtained for prediction of prematurity was 7.35cm. A cutoff score of 7.35 had sensitivity and specificity of 80% and 78 % respectively in predicting prematurity.

**Table 1: Distribution of gestational age in weeks with the corresponding median values of foot length and IQR**

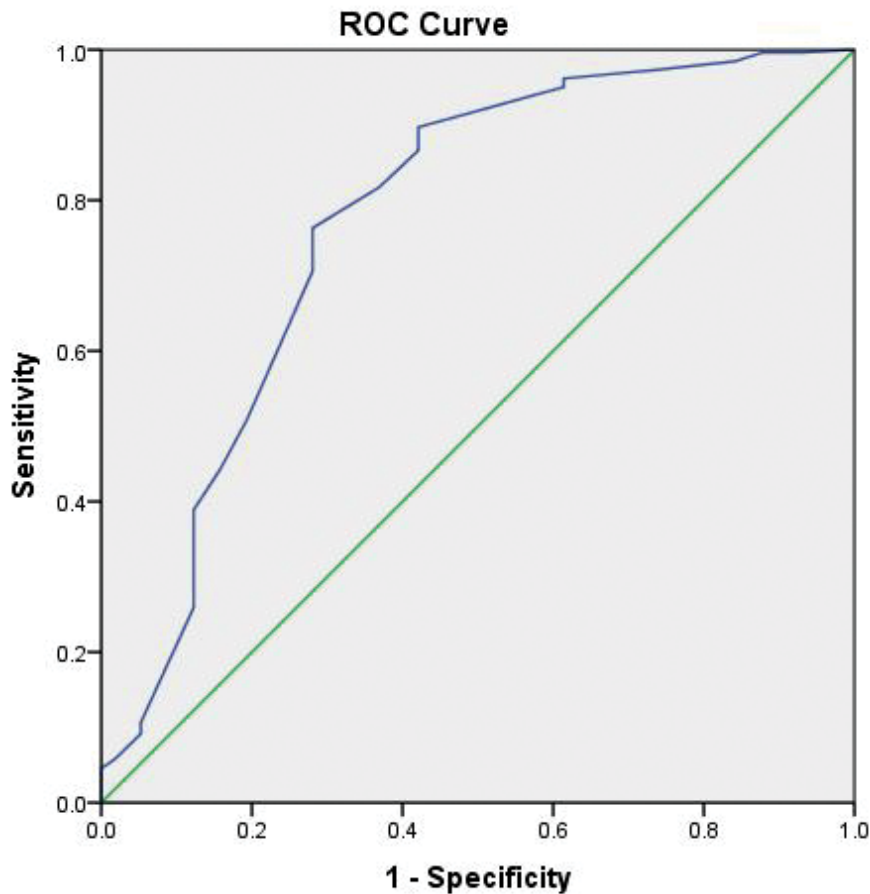
Gestational age in weeks	Foot length median(IQR)
28 (n=2)	7.2 (6.8)
30(n=1)	6.4 (6.4)
31(n=2)	7.6 (7.0)
32(n=3)	6.6 (6.6)
33(n=10)	6.8 (6.1-7)
34(n=6)	7.1 (6.475-7.75)
35(n=18)	7.0 (6.6-7.225)
36(n=15)	7.5 (7.3-8)
37(n=58)	7.5 (7.2-7.725)
38(n=85)	7.6 (7.4-7.85)
39(n=78)	7.6 (7.4-8)
40(n=36)	7.75 (7.5-8.075)
41(n=3)	7.8 (7.5)
42(n=3)	8.2 (7.8)

**Table 2: Median and IQR of the study parameters in pre term and term neonates**

Characteristic	Preterm neonates (N= 57) Median(IQR)	Term neonates (N= 263) Median(IQR)	P value
Foot length (cm)	7.0(6.6-7.5)	7.6(7.4-8.0)	<0.0001*
Head circumference (cm)	32(31-34)	33(33-34)	<0.0001*
Crown heel length (cm)	44(41.5-47.5)	47(45-50)	<0.0001*
Weight (kg)	2.5 (1.74-2.9)	2.9(2.7-3.2)	<0.0001*
Gestational age by Ballard’s scoring	35(33-36)	38(38-39)	<0.0001

**Table 3: Correlation coefficient of foot length with neonatal anthropometry**

Parameter	Preterm neonates (N= Correlation coefficient ( p value)	Term neonates (N= Correlation coefficient ( p value)
Crown heel length	0.671 (<0.0001)	0.083 (0.18)
Weight	0.771 (<0.0001)	0.151 (0.01)
Head circumference	0.599 (<0.0001)	0.480 (<0.0001)
Gestational age by Ballard’s scoring	0.274 (0.04)	0.088 (0.15)



Diagonal segments are produced by ties.

**Figure 1: ROC curve of the neonatal foot length in predicting prematurity in the study population**

## DISCUSSION

Over the last two decades the childhood mortality rate and infant mortality rate have shown a rapid decline. However, the reduction in neonatal mortality rate is not satisfactory. Addressing the leading cause of neonatal mortality like prematurity, birth asphyxia, and neonatal infections will bring out a decline in the neonatal mortality rate. Early recognition of preterm babies and prompt initiation of supportive measures improve the neonatal survival<sup>4</sup>. In poor resource settings where the incidence of home deliveries is high, identification of high-risk neonates is missed<sup>5</sup>. Anthropometric data by the peripheral health workers have shown to be more reliable in identifying the preterm babies than the new Ballard's score<sup>6</sup>. Hence there is a need for simple and easy anthropometric measurement to identify the preterm births.

Neonatal anthropometric assessments have shown varied results for gestational age assessment<sup>2,3,7,8</sup>. A study by Lee et al. showed that new born clinical assessment by community health workers was inaccurate for gestational age determination compared to the ultra sound dating<sup>3</sup>.

A hospital-based cross-sectional study by Hadush et al. concluded that head circumference and chest circumference as better surrogate markers in identifying low birth weight neonates compared to the foot length<sup>8</sup>.

A study by Otupiri et al. in Ghana showed that birth weight had the highest correlation with chest circumference, mid-upper arm circumference, and calf circumference. They concluded that these anthropometric measurements could be used as a surrogate marker for identifying the low birth weight babies when the weighing scale is not available to check the birth weight in resource-poor settings<sup>9</sup>.

A cross-sectional hospital-based study by Srinivas et al. in Southern India opined that the foot length had 97% sensitivity and 87% specificity in identifying preterm and low birth weight babies. They also observed that the foot length had a significant correlation with anthropometric measures like weight, length, head circumference and chest circumference<sup>10</sup>.

The present study showed similar results of foot length being a good surrogate marker in identifying the preterm births. The cut-off value of 7.35 obtained from ROC curve showed a sensitivity of 80% and specificity

of 78% in identifying the preterm babies. We observed, that, a significant correlation of foot length with weight, head circumference, crown-heel length and gestational age by Ballard's score in preterm neonates. However, a statistically significant correlation of foot length was found with weight and head circumference in term neonates.

A hospital-based study used a plastic ruler method to measure the foot length. They identified 7.2cm as a cut-off to predict the low birth weight babies and 7.8cm as a cutoff to predict the preterm births. They showed that the foot length measurement by plastic ruler was a better predictor for low birth weight than prematurity<sup>11</sup>.

**Limitations:** This study was a hospital-based study in a tertiary care referral hospital, hence the results may not be reflective of the community. The study population comprised of mainly term babies and less number of preterm babies. Larger sample size, community-based study may increase the strength of the study

## CONCLUSION

We observed that the neonatal foot length had a significant correlation with anthropometric parameters like birth weight, length, and head circumference in preterm neonates. The value of < 7.35cm can be used a cut off to identify preterm neonates in poor resource settings where weighing scale may not be available at birth.

**Conflict of Interest:** None

**Source of Funding:** Manipal Academy of higher education student grant

**Ethical Clearance:** Obtained from Kasturba Medical College Mangalore ethics committee

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# Clinical Profile of Children with Autism Spectrum Disorder: A Study from Coastal Karnataka

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## ABSTRACT

**Introduction:** Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by deficits in verbal and nonverbal communication and reciprocal social interaction. The present study aimed to describe the clinical characteristics of ASD and analyze the possible risk factors in the coastal city of Karnataka.

**Material and Method:** This descriptive study included 30 children diagnosed with ASD. The study was approved by the Institutional ethics committee. After obtaining the informed consent, a structured interview was conducted to get details on symptomatology and possible risk factors followed by a clinical examination. Childhood autism rating scale scoring was used to quantify the severity of autism. The data were analysed using SPSS version 11.5

**Results:** The observed male to female ratio was 1.3:1. Mean age of presentation was 2.8 years. Speech delay was the predominant symptom on reporting, seen in 70% children. Impaired peer group interaction was the most common social impairment seen in 24 (80%) subjects. Mild, moderate and severe autism was seen in 5(16.7%), 12(40%) and 13(43.3%) subjects respectively. Among the risk factors, forceps delivery and maternal age were significantly related to autism. There was no significant relationship between the severity of autism and gender, birth order or working pattern of parents.

**Conclusion:** Autistic children presented with varying clinical features. There is a need for increased awareness about ASD to facilitate early diagnosis and intervention. The risk factors which predispose to ASD are not clearly understood, hence require further elucidation.

**Keywords:** Autism spectrum disorder, child, mental health, risk factors

## INTRODUCTION

Autism spectrum disorder (ASD) is a heterogeneous, neurodevelopmental disorder<sup>1, 2</sup>. The reported prevalence of this condition is as high as 1 in 65 Indian children in 2-9 year age group<sup>1</sup>. ASD is characterized by deficits in verbal and nonverbal communication and reciprocal social interaction. Various comorbidities like

motor deficits, genetic conditions, delayed acquisition of self-help skills, sleep problems and catatonia are associated with ASD<sup>3</sup>. Though symptoms of ASD are present in early, they are recognized commonly in the second year of life. Various risk factors like genetic, infections, environmental factors have been implicated in ASD<sup>4</sup>. The present study aimed to describe the clinical characteristics of ASD and analyse the possible risk factors in the coastal city of Karnataka.

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## MATERIAL AND METHOD

This descriptive study was conducted in the tertiary care teaching hospital affiliated to Kasturba Medical College (Manipal Academy of Higher Education) Mangalore and Chethana child development centre, Mangalore over a period of 18 months. Approval was

obtained from the Institutional Ethics Committee (IEC) of Kasturba Medical College, Mangalore after which permission was obtained from the Authorities of the concerned hospital and Chethana child development centre for conduction of the study. Children diagnosed to have autism spectrum disorders according to DSM-IV criteria were included in the study. Children with chronic illness were excluded. A structured interview was conducted to collect data on chief complaints, time lag, behavioral abnormalities, and possible risk factors, followed by a general and systemic examination. Childhood autism rating scale (CARS) scoring was used to quantify the severity of autism. Age and sex-matched controls were taken, and risk factors were analysed. The collected data were coded and entered into Statistical Package for Social Sciences 11.5 (SPSS Inc., Chicago, Ill., USA). Results were interpreted with frequency tables and statistical significance computed by Chi-square, unpaired student t-test, Kruskal-Wallis test, and Mann-Whitney test.  $p < 0.05$  was considered as statistically significant.

**RESULTS**

Out of 30 children, 17 were male (57%), and 13 were female (43%). The observed male to female ratio was 1.3:1. Twelve (40%) study subjects were less than five years old. Mean age of presentation was noted to be 2.8 years in our study. Speech delay was the most predominant complaint on reporting, seen in 21 (70%) children. Table 1 depicts the chief complaints on reporting in the study subjects. Minimum age of presentation was six month, in which case autism was suspected due to poor eye contact. Most of the parents sought expert opinion within the first year of presentation. Diagnosis made on the first consultation is depicted in Table 2. The time lag for diagnosis from the first consultation is shown in Figure 1. Developmental examination revealed speech delay in 96% of patients and gross motor delay was observed in 70% subjects. Impaired peer group interaction was the most common social impairment seen in 24 (80%) subjects. Clinical features of the study subjects are depicted in Table 3. The severity of the autism was assessed with childhood autism rating scale (CARS). Mild, moderate and severe autism was seen in 5(16.7%), 12(40%) and 13(43.3%) subjects respectively. Out of the risk factors studied, forceps delivery and age group of mothers were significantly related to autism. There was no significant relationship noted between severity of autism and gender, birth order or working pattern of parents.

**Table 1: Chief complaints on reporting in the study subjects**

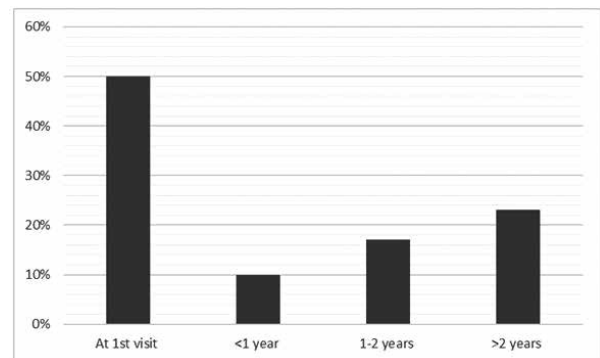
Chief Complaints	N = 30, n (%)
Poor eye contact	13 (43)
Speech delay	21 (70)
Hyperactivity	10 (33)
Developmental delay	2 (7)
Emotional disturbance	1(3)
Self-injury	2 (7)

**Table 2: Diagnosis made on the first consultation in the study subjects**

First diagnosis	N = 30 n (%)
Autism	15 (50)
Speech delay	9 (30)
Mental retardation	4 (14)
Behavioral disturbance	2 (7)

**Table 3: Clinical features in the study subjects**

Parameter	N = 30, n (%)
<b>Social Deficits</b>	
Impaired peer group Interaction	24(80)
Hyperactivity	10 (33)
Emotional disturbances	16(53)
Impaired nonverbal behavior	23(77)
<b>Communication Deficits</b>	
No communication	15 (50)
Echolalia	3 (10)
Difficulty in initiating conversation	12 (40)
<b>Restricted Activities</b>	
Stereotyped movements	9 (30)
Insistence on routines	26 (87)



**Figure 1: Time lag from first consultation to diagnosis**

## DISCUSSION

The observed male to female ratio was 1.3: 1. Studies conducted by Sharma et al. and Prathiba Singhi noted ratios of 2.2: 1 and 1.3:1 respectively<sup>5,6</sup>. The most common complaint was speech delay accounting for 70% cases. Other main complaints were poor eye contact (43%) and hyperactivity (33%) Children less than two years of age presented mostly with poor eye contact and lack of social smile, corresponding to the study conducted by Sharma et al.<sup>5</sup>. In the present study, the average age of presentation was 2.8 years corresponding to 2.6 years in a study by Barbaresi et al. and Coplan et al.<sup>7,8</sup>. The study by Sharma et al. showed the average age of 3.28 years<sup>5</sup>. The minimum age of presentation was six months wherein child presented with poor eye contact. This finding correlates with a study by Charman et al. where children less than one year of age presented with problems of social interaction like poor eye contact<sup>9</sup>.

Autism was the first diagnosis in the present study compared to 7 % in the study by Sharma et al.<sup>5</sup>. This improvement in the diagnosis can be explained due to the increased awareness about the disease. Other diagnoses made on the first consultation were speech delay (30%), mental retardation (14%) and behavioural disturbance (7%) the mean time lag between the clinical presentation and diagnosis was one year. Children with the time lag of more than 2 years were treated as speech delay or mental retardation. In the study done by Sharma et al., Prathibha Singhi et al. and Barbaresi et al., most of the children were referred to as mental retardation and attention deficit hyperactivity behaviour<sup>5-7</sup>. Maternal age was found to be a significant risk factor in our study.

The incidence of most of the clinical features was comparable with the study by Prathibha Singhi et al.<sup>6</sup>. Emotional disturbances (53%) and stereotyped movements (30%) were found to be lower in our study whereas difficulty in initiating conversation was higher (40%). The severity of autism was assessed with CARS. Most of the children belonged to severe category. There was no significant gender difference in the severity of cases in contrast to previous studies which showed male preponderance in severe cases<sup>10,11</sup>.

## CONCLUSION

Autistic children presented with varying clinical features. The most common complaint was speech delay.

A mean time lag of 1.8 years for the diagnosis of autism was noted. Out of the risk factors studied, forceps delivery and maternal age were significantly related to autism.

**Conflict of Interest:** None

**Source of Funding:** None

**Ethical Clearance:** Obtained from Kasturba Medical College Mangalore ethics committee

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# A Study on the Nutritional Status of the School Going Adolescents of East Sikkim, North East India

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## ABSTRACT

Malnutrition arises either from deficiency or excess or imbalance of nutrients in the body. It is a term comprising all states of underweight & overweight. Adequate data on the nutritional status on the age group of adolescents, defined by WHO as individuals in the age group of 10-19yrs, is lacking.

**Method:** A Descriptive Cross sectional study using Multi-stage random sampling was carried out among adolescent students in Co Educational Senior Secondary Schools (Co-Ed SSS) of East Sikkim.

**Sample size:** Considering a Prevalence of malnutrition as 40%, relative error of 10% and using formula:  $4 \text{ PQ/L}^2$ , Sample Size calculated to be 600.

**Results and Conclusions:** Private/Public and Government schools were covered to get a representative sample from all socioeconomic classes. Total 616 study subjects were included in the study. 27.4% of the school going adolescents were found to be malnourished in this present study. Both extremes of malnutrition are seen in the adolescent students of East Sikkim. The prevalence of Overweight/Obesity or Thin/Extreme Thinness among study subjects were observed to be 12.8%/2.8% and 8.4% /3.4% respectively.

**Keywords:** adolescents; malnutrition; overweight; undernutrition, north east India, Sikkim

## INTRODUCTION

Malnutrition is a term which denotes deterioration of health, arising either from deficiency or excess or imbalance of nutrients in the body. It is a term comprising all three states of underweight, overweight and obesity. This nutritional problem is well prevalent even in the adolescent group defined by World Health Organisation(WHO) <sup>[1]</sup> as belonging to the age group of 10-19 years. Adolescence literally means “to emerge” or “achieve identity”. Its origin is from a Latin word “Adolescere” meaning, “to grow, to mature”<sup>[2]</sup>. Significant transition from childhood to adulthood, takes place during this period of adolescence. This period provides an opportunity to prepare for a healthy

productive and reproductive life. Imbalance in nutrition in this phase can potentially retard growth and sexual maturation, although these are likely consequences of chronic malnutrition in infancy and childhood being carried over. It can put them at high risk of nutrition-related chronic diseases, which has now become the new age epidemic of diseases, particularly if combined with other adverse lifestyle behaviours.

Adequate data on the nutritional status of adolescents is lacking globally, nationally or locally. WHO factsheet states that many boys and girls in developing countries enter adolescence undernourished, making them more vulnerable to disease and early death<sup>[1]</sup>. The estimates in developing world, states that approximately 146 million children are underweight, and out of these 57 million children live in India<sup>[3]</sup>. The other spectrum of Malnutrition, Overnutrition among adolescents is also seemingly increasing in both in developed and developing countries<sup>[1]</sup>. The secondary analysis of National Family and Health Survey (NFHS) 1, 2 & 3 on the nutritional status of adolescents, estimated on the basis of their body mass index (BMI), revealed that 49%

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of girls and 60% of boys in the age group of 15-19 years are malnourished<sup>[4]</sup>.

Adolescents however have been the most neglected age group in public health. It is, in reality, a timely period to shape and inculcate healthy eating and lifestyle behaviours, thereby preventing or postponing the onset of nutrition-related chronic diseases in adulthood. The World Health Organization has identified India as one of the nations that is going to have most of the lifestyle disorders in the near future. The Younger Population, including the adolescents are being affected by these newer lifestyle disorders. Hence, the population at risk shifts from 40 plus to 30 plus or even younger<sup>[5]</sup>. This nutrition transition occurring worldwide is characterised by changes in diet and activity patterns, leading to the development of a double burden of malnutrition that is undernutrition and overnutrition.

## MATERIALS AND METHOD

**Study Setting:** East Sikkim

**Study Design:** Descriptive Cross sectional study

**Sampling Technique:** Multi-stage random sampling

**Inclusion Criteria:** Students within the age group of 10-19 yrs from Class V – XII

**Study Population:** Boys and Girls within the age group of 10-19yrs studying in Co-educational Senior Secondary Schools(Co-Ed SSS)

**Study Period:** Feb 2013 – Nov 2014

**Sample Size:** Considering a Prevalence of Malnutrition as 40%<sup>[6]</sup> relative error of 10% and using the formula  $4PQ/L^2$ , sample size was calculated to be 600.

$$\frac{4 \times 4 \times (100 - 40)}{(10\% \times 40)^2} = 600$$

**Data Collection Procedure:** The Protocol was submitted to the Institutional Review Board(IRB) and Institutional Ethics Committee(IEC) of Sikkim Manipal Institute of Medical Sciences (SMIMS) and clearance obtained.

Permission was taken from Human Resource and Development Department (HRDD), Government of Sikkim to carry out the study in Co- Ed SSS of East Sikkim.

**First Stage:** A List of Co-ed SSS in East Sikkim was taken from the HRDD department. For operational feasibility, only 25 % of the listed schools (total 6 schools) was chosen by lottery method.

After selection, the schools were visited and permission from the Principal taken to start the study in the selected schools.

**Second Stage:** A list of the students studying from Class 5 till 12 was taken from the principals office.

One section from each class was selected using lottery method.

**Third Stage:** Number of students to be taken from each school and each class was calculated according to systematic random sampling.

The participants informed about the study and Informed consent taken from the guardian. Only those students present on the day of the study and willing to give assent were included in the study. For every selected student not giving consent, the next roll number student was enrolled till the number required fulfilled from the school.

The participants were then called to a fixed allocated examination area given by the school authorities, each interviewed individually and the anthropometric measurements recorded using standard protocols.

Height Measured using a Stadiometer and weight measured using a standard calibrated mechanical weighing machine.

Body Mass Index(BMI) was calculated and plotted using WHO recommended BMI for age and sex charts.

## RESULTS

Both Private/Public (3) and Government schools (3) were covered to get a representative sample from all socioeconomic classes.

**Table 1: Distribution of study subjects in relation to the type of school they attend:**

Variables	Private/Public SSS N = 276 Number (%)	Government SSS N = 340 Number (%)	Total N = 616 Number (%)
Students	276(44.8)	340(55.2)	616(100)
Male	133	148	281(45.62)
Female	143	192	335(54.38)

<b>Religion</b>			
Hindu	137 (49.6)	171 (50.3)	308 (50)
Muslim	0(0)	5 (1.5)	5 (0.8)
Christian	14 (5.1)	58 (17.1)	72 (11.7)
Buddhist	125 (45.3)	106 (31.2)	231 (37.5)
<b>SES Acc TO BGP*</b>			
CLASS 1	212(76.8)	11(3.2)	223(36.2)
CLASS 2	44(15.9)	33(9.7)	77(12.5)
CLASS 3	12(4.3)	49(14.4)	61(9.9)
CLASS 4	8(2.9)	120(35.3)	128(20.8)
CLASS 5	0	127(34.7)	127(20.6)
<b>Fathers Educational Status</b>			
Illiterate	4(1.4)	74(21.7)	78(12.66)
Primary	7(2.5)	110(32.4)	117(18.99)
Secondary	15(5.4)	112(33)	127(20.61)
High School	47(17)	37(10.9)	84(13.64)
Graduate	182(65.9)	6(1.8)	188(30.52)
Post Graduate	21(7.6)	1(0.3)	22(3.57)
<b>Mothers educational status</b>			
Illiterate	5(1.8)	125(36.8)	130(21.1)
Primary	11(4)	115(33.8)	126(20.45)
Secondary	32(11.6)	81(23.8)	113((18.34)
High School	85(30.8)	17(5)	102(16.56)
Graduate	126(45.7)	2(0.6)	128(20.78)
Post Graduate	17(6.2)	0(0)	17(2.76)

\*BGP = B G Prasad socioeconomic scale

Total 616 study subjects were included in the study. The Demographic Parameters have been divided according to the type of school attended (Table 1).

**Table 2: Distribution of the study subjects according to their BMI for age in association to the type of school which they attend**

	<b>Private/Public SSS N = 276 Number (%)</b>	<b>Government SSS N = 340 Number (%)</b>	<b>Total N = 616 Number (%)</b>
Obese	15(5.4)	2(0.6)	17(2.8)
OW	48(17.4)	31(9.1)	79(12.8)
Normal	174(63)	273(80.3)	447(72.6)
Thin	26(9.4)	26(7.6)	52(8.4)
Ext Thin	13(4.7)	8(2.4)	21(3.4)

NB: OW=Overweight

The prevalence of Overweight/Obesity and Thin/Extreme Thinness in the study subjects were observed to be 12.8% & 2.8% and 8.4% & 3.4% respectively. (Table 2)

**Table 3: Distribution of malnutritional status with relation to various variables**

Variable	Obese/Overweight		Underweight	
	P value	Chi square,df	P value	Chi square,df
Type of school	0.000	X <sup>2</sup> = 22.903, df = 1	0.020	X <sup>2</sup> = 5.455, df = 1
father's educational qualification	0.000	X <sup>2</sup> = 46.067, df = 1	0.030	X <sup>2</sup> = 12.392, df = 1
mother's educational qualification	0.000	X <sup>2</sup> = 23.036, df = 1	0.076	X <sup>2</sup> = 9.972, df = 1
SES	0.000	X <sup>2</sup> = 36.332, df = 4	0.138	X <sup>2</sup> = 6.967, df = 4
Frequency of intake of vegetables	0.000	X <sup>2</sup> = 19.709 df = 3	0.013	X <sup>2</sup> = 10.748 df = 3
Frequency of intake of fast food	0.000	X <sup>2</sup> = 22.327 df = 4	0.785	X <sup>2</sup> = 1.733 df = 4
Duration of sleep in 24 hours	0.009	X <sup>2</sup> = 9.358 df = 3	0.929	X <sup>2</sup> = 0.147 df = 3
Duration of sedentary habit in 24 hours	0.001	X <sup>2</sup> = 16.966 df = 3	0.236	X <sup>2</sup> = 4.251 df = 3
Awareness of free time by their parents	0.001	X <sup>2</sup> = 19.661 df = 4	0.027	X <sup>2</sup> = 10.971 df = 4
Perception of their own weight	0.000	X <sup>2</sup> = 18.159 df = 3	0.001	X <sup>2</sup> = 16.976 df = 3
Perception of maintenance of their bodyweight	0.000	X <sup>2</sup> = 31.348 df = 3	0.201	X <sup>2</sup> = 4.626 df = 3

P value of <0.05 is taken to be statistically significant.

X<sup>2</sup> = Chi square, df= degree of freedom

Obese/overweight or thinness/extreme thinness was seen more in the public schools as compared to the government schools (Figure 3). Statistically significant association was seen between the BMI of the study population to the type of school. p value= 0.000 (X<sup>2</sup>=30.395, df=4)(Table 3)

Age, Sex, Religion, Caste, Type of diet were found to be statistically not significant with both extremes of malnutrition.

## DISCUSSION

In the present study, the prevalence of overweight/obesity was 12.8% and 2.8% respectively. This is comparable to studies done in Midnapore, Kolkata<sup>[7]</sup> and Kerala<sup>[8]</sup> which reported the prevalence of overweight/obesity in adolescents to be 14.9% and 3.8% and 12%/8.3% respectively .

The prevalence of undernutrition in this study was 14% with prevalence of thin/extreme thinness of 8.4% and 3.4% respectively. Similar findings was found in a study in Midnapore<sup>[7]</sup> where the prevalence was found to be 20%. The prevalence found in studies in Chetla<sup>[9]</sup> and<sup>[6]</sup> in west Bengal was more than half the findings of this study where the prevalence was found to be 47.93% and 40% respectively. Apart from the differences in the sociocultural behaviours of the different areas, some differences in prevalence may be also because of the different methods of reference categories used in different studies for adolescents.

The proportion of overweight/obesity (65.6%) was high in study subjects who were from public schools. The odds of becoming overweight/obese was 2.99 times more among those from public schools. Similar finding was found in a study done in Wardha<sup>[10]</sup> where the prevalence of overweight/ obesity was significantly higher among children from Public/private school with odds of 3.04. Similarly a study done in Puducherry<sup>[11]</sup> showed overweight/obesity was significantly high among public school students. The prevalence of undernutrition in public schools was 18.3% and the difference found to be statistically significant with odds of 1.8 times more in public schools. Similar findings were found in a study in Lucknow<sup>[12]</sup>.

In this study, the prevalence of overweight/obesity was found more in girls (11.90%) as compared to boys (6.80%) with the odds of overnutrition in girls to be 1.85 times more as in boys and the difference was found to be statistically significant. Similar finding was reported from studies done in Puducherry<sup>[11]</sup> and in Saudi Arabi<sup>[13]</sup>. In contrast to the above findings, the prevalence of overweight/obesity was found high in boys as compared to girls in other studies<sup>[6]</sup><sup>[14]</sup>. In a study in Nagpur no difference in sex was observed<sup>[10]</sup>.

The relationship between prevalence of overweight/obesity and Socioeconomic status was statistically significant ( p= 0.000 ) with high proportion of overweight /obesity seen in class 1 (61.5%). Similar results were seen in studies done in Belgaum<sup>[15]</sup> ( using similar scale.)and others<sup>[16][17]</sup>.



The prevalence of overweight/obesity in this study was high in study subjects whose father and mother were graduates (46.9% and 28.1% respectively). A study<sup>[16]</sup> mentions that parents' educational status has an effect on children's obesity. Another study<sup>[17]</sup> showed low parental educational status was significantly associated with childhood overweight/obesity.

## CONCLUSION

This study thus showed that 27.4% of the school going adolescents were malnourished. A Double Burden of Undernutrition as well as OverNutrition is thus seen prevailing among the adolescent students in East Sikkim, A state in North east India where research has been a grey area till a few years ago. Thus such findings among the people in this part of the country may help the decentralised policies in the next few years.

**Conflict of Interest:** Funding: the study received no research grants or funds from any research body.

**Ethical Approval:** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent:** A Blanket Informed consent was first obtained from the HRDD department to perform the study in the school students.

Informed consent was then obtained from all consenting parents of the individual participants included in the study. Assent was also obtained individually from the individual participating adolescent.

**Ethical Clearance:** The Protocol was submitted to the Institutional Review Board(IRB) and Institutional Ethics Committee(IEC) of Sikkim Manipal Institute of Medical Sciences (SMIMS) and clearance obtained.

Permission was taken from Human Resource and Development Department (HRDD), Government of Sikkim to carry out the study in Co- Ed SSS of East Sikkim.

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# The Combined Effect of Continuous Run, Alternate Pace Run and Fartlek Training on Selected Physiological Variable among Male Athletes

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## ABSTRACT

The study aims to determine the effect of continuous run, alternate pace run and fartlek training on the selected physiological variable ( Resting Pulse Rate) among the male athletes of Alagappa University affiliated colleges. The research involved a random subject selection of fifty athletes with age ranging from 17-25 years and had five equally divided groups namely experimental groups A, B, C, D and control group E with 10 athletes each. The groups endured the training activities for twelve weeks with a schedule of thrice a week whereas the control group remained with no activities. The data procured in prior and after the training programme was examined with the application of Analysis of Covariance and the fixation of level of significance at 0.05. Scheffe's test was applied at the significance of 'F' ratio in order to evaluate the differences that occur significantly between the paired means. The study revealed that the selected physiological variable of the combined group with the three endurance trainings outperformed the other groups.

**Keywords:** Continuous running, Alternate Pace Run, Fartlek Training, Resting Pulse Rate, ANCOVA

## INTRODUCTION

A mission for perfection is often confronted with numerous difficulties. To improve the sports performance the athlete needs to take part in systematic training by the way of scientific method of training. Therefore athletes or players need proper systematic training to improve their performance through different kinds of training.<sup>1</sup> Significant improvement in VO<sub>2</sub> max may not be possible when the runner reaches a plateau. It is, therefore, suggested that more emphasis should be given to improve the anaerobic threshold level of athletes.<sup>2</sup> Actual effect of training depends upon several factors such as training loads, means of recovery, assessment of load and performance capacity, sports equipment, nutrition, psychological characteristics and method adopted for imparting theoretical instruction.<sup>3</sup> The tendency of the systems of heart and blood vessels, lungs, body temperature regulators, body constituents, and the function of muscles and skeleton upon the capacity of an athlete leads to the enhancement of sports performance.<sup>4</sup>

**Continuous Run:** Continuous running boosts the heart rate to the vicinity of 130 and 160 thumps for a

given period of time at a relentless pace or power. The average time span of such running will be more than 30 minutes for a youthful competitor and from 60-120 minutes for an adult. Continuous training structures the reason for all other preparing techniques both anaerobic and aerobic.<sup>5</sup> Ernst Van Aaken, German physician and coach, is credited with introducing and popularizing this system of training. Ernst Van Aaken's work in this area started in 1920's but received widespread support at the later. Continuous training differs from maximum force constant action of slow time span to minimum-force action of a broadened span, long-slow distance, or "LSD" method. The long distance sprinter keeps up a pace that is simply beneath his dashing pace, despite the fact that this will rely upon the overall distance and the distance of preparation runs.

**Alternative Pace Run:** Running for long time at a speed with a variation in progressive stretches in accordance with a plan is Alternative pace run. In general, for a person at slow pace for 1.0 km, the heart rate ranges from 130 to 150 beats per minute while considering fast pace for 0.5 km, the heart rate ranges from 170 to 180 beats per minute. The maximal oxygen intake at a subsequent

distance of 1.0 km is stirred up. The alternative pace run supports the consumption of oxygen and the ability of varying speed.

**Fartlek Training:** Fartlek Training involves the fluctuation of force indicated by the necessity of the athlete and the wavy surfaces and edges of landscape. It strengthens the endurance by maintaining proper balance in ankle, knee and hip. It involves the fluctuation of pace during the run, switching between quick and slow runs that are more unordered. No prefixed time laps and pace makes fartlek training stand out from other training methods. Fartlek conditioning lets oneself to explore his/her ability and aerobic capacity levels. Further, it can encourage oneself to train longer and hard by improving anaerobic threshold levels. Main difference of fartlek training from regular is that the participant can work out by altering the intensity levels.<sup>6</sup>

**Resting Pulse Rate:** Normal pulse measures the beats every minute at rest. It signifies the general wellbeing of the heart and the level of fitness. Well trained adult athlete’s normal pulse rate values between 60 and 40. It could be measured through palpation method.

**Statement of the problem:** The purpose of the study was to find out the Effect of Continuous Running, Alternate Pace Run, Fartlek Training on Selected physiological variable (Resting Pulse Rate) of male athletes.

**METHODOLOGY**

The research was designed to discover the effect of continuous run, alternative pace run and fartlek training

on physiological variable (Resting Pulse Rate) by using Alagappa university college’s athletes. For this purpose, fifty athletes from the college were chosen randomly as subjects for the study and their age ranged between seventeen and twenty five years.

**Test Administration of Resting Pulse Rate**

**Purpose:** The test aimed to evaluate the rate of resting pulse of the subject.

**Equipments:** Stop clock, paper, pencil.

**Procedure:** The pulse of the subject on the radial artery in the fore arm and the carotid artery beneath the neck was checked by placing the index and middle fingers. The pulse of the subject each minute for 3 minutes in the morning at rest before the training was recorded. It helped the subject to keep up the optimal zone during the training session.

**NORMAL RESULTS AND DISCUSSION**

The normal rate of resting pulse for an adult is from 60 to 100 beats a minute. It varies based on the age and physical condition of an individual. The analysis of data on Resting Pulse Rate has been examined by ANCOVA for variables separately in order to determine the differences if any among the group at pre and posttest when the differences was found to be significant by ANCOVA, the Scheffe’s post hoc test was applied to assess the significant differences between the adjusted mean.

**Table 1: ANCOVA for the data extracted from the pre and post tests of the training groups of Continuous, Alternate Pace Run, Fartlek, Combined and Control methods on Resting Pulse Rate (Manual Method means count beat per minute)**

Test	CNG	APG	FTG	CMG	CTG	Source of Variation	Variation in Sum of Squares	Df	Squared Mean	‘F’ Ratio observed
<b>Pre test</b>										
Mean	72.9	72.3	73.1	72.9	72.6	Between	3.92	4	.980	.032
SD	7.21	4.57	6.62	4.70	3.77	Within	1379.2	45	30.649	
<b>Post test</b>										
Mean	66.3	65.5	64.9	63.2	73.1	Between	580.0	4	145	14.002 *
SD	1.70	4.30	2.84	2.09	4.22	Within	466	45	10.356	
Adjusted post test mean	66.26	65.62	64.811	63.16	73.14	Between	588.547	4	147.137	17.39*
						Within	372.293	44	8.461	

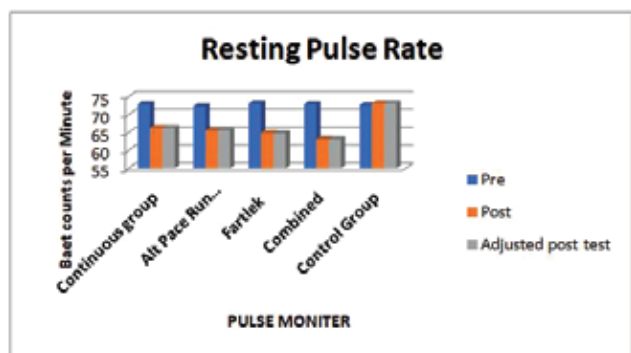
\*Required table value with significant level at 0.05, degree freedom 4 and 45 and 4 and 44 are 3.20 and 3.21 respectively.

B.M., W.G, B.S, W.S are Between Means, Within Groups, Between Sets , Within Sets respectively.

(Manual Method means count beat per minute)

The data from the above table I indicates that the means of pre-test measures of the training groups of continuous, alternative pace running ,fartlek, combined and control methods are 72.9,72.3,73.1,72.9 and 72.6 respectively. The value of F ratio .032 for the pre-test was lesser than 2.58 of table value for degree of freedom 4 and 45 necessary for significance level at 0.05. The means of post-test of the training groups of continuous, alternative pace, fartlek combined, control methods were 66.3,65.5,64.9,63.2 and 73.1 respectively. The ratio of F 14.002 for the pre-test was lesser compared with 2.58 table value of for degree of freedom 4 and 45 necessary for a level of significance at 0.05 fixation. The means of adjusted post test related to the training groups of continuous, alternative pace running, fartlek, combined and control methods were 66.26,65.62,64.811,63.16 and 73.14 respectively. The F ratio 17.39 obtained for post-test was greater than 2.58 of table value for degree of 4 and 45 necessary for significance level at 0.05.

The analysis mentioned above shows that the means belonging to the adjusted post-test of the all the five groups differed significantly. For post hoc test Scheffe's test as was used in order to identify which specific group had the significant difference and to find out which paired means showed significance of difference and the produced results are listed in Table II.



**Figure 1: Mean values of adjusted post-test of the training groups of continuous, combined and control methods on Resting Pulse Rate (Manual Method means count beat per minute) \*Significance level at 0.05**

The above table shows the results achieved as a result of the Scheffe's Post hoc test. It could also be observed that the difference in means between continuous training group and alternative pace running group was .644 ( $P < 0.05$ ) and the calculated C.I value was 4.18\* ( $P > 0.05$ ). The mean difference between the training groups of continuous and

fartlek methods was 1.452 ( $P < 0.05$ ) and the calculated C.I value was 4.18\* ( $P > 0.05$ ). The mean difference among the training groups of continuous and combined methods was 3.1 ( $P > 0.05$ ) and the calculated C.I value was 4.18\* ( $P < 0.05$ ). The mean difference among the training group of continuous and control methods was 6.87\* ( $P > 0.05$ ) and the calculated C.I value was 4.18 ( $P > 0.05$ ). The mean difference between the alternative pace running group and Fartlek training group was .809 ( $P > 0.05$ ) and the calculated C.I value was 4.18\* ( $P > 0.05$ ). The mean difference between the alternative pace running training group and combined training group was 2.45 ( $P > 0.05$ ) and the calculated C.I value was 4.18\* ( $P > 0.05$ ). The mean difference among the alternative pace run group and control group was 7.52\* ( $P > 0.05$ ) and the calculated C.I value was 4.18 ( $P > 0.05$ ). The mean difference among the training groups of Fartlek training and combined methods was 1.64 ( $P > 0.05$ ) and the calculated C.I value was 4.18\* ( $P > 0.05$ ). The mean difference among the training groups of fartlek and control methods was 8.33\* ( $P > 0.05$ ) and the calculated C.I value was 4.18 ( $P > 0.05$ ). The mean difference among the training groups of combined and control methods was 9.97\* ( $P > 0.05$ ) and the calculated C.I value was 4.18 ( $P > 0.05$ ). From that it can be clearly noticed that combined training group showed improvement with the influence of resting pulse rate in comparison with the groups of continuous, alternative pace run group, fartlek training and control training. The training group of fartlek method responded better when compared with continuous training group, alternative pace run group and the control group. The alternative pace run group responded better when compared with training groups of continuous and the control methods. The continuous training group performed better compared to the control group.

**Discussing on findings:** The current study clearly reveals the significant improvement of the combined training group on the variable of resting pulse rate when compared with the groups of continuous, alternative pace run group, fartlek and control training methods.

**Discussion on hypotheses:** In the hypothesis it was stated that there would be significant improvement on the selected physiological variable due to the Effect of Continuous Running, Alternative Pace Run and Fartlek Training. The result shows that due to the Effect of Continuous Running, Alternate Pace Run and Fartlek Training on selected performance variable namely resting pulse rate have significantly improved. Hence it proved that the research hypothesis was accepted.

## **CONCLUSIONS**

1. Resting Pulse Rate was significantly improved by the Continuous running group, Alternate Pace Run and Fartlek training group when compared with control group.
2. There is no significant improvement in resting pulse rate between Continuous running group, Alternate Pace Run and Fartlek training group.

**Ethical Clearance:** Nil

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Prevalence of Lifestyle Related Risk Factors for Non-communicable Diseases among Adolescents of an Urban Community in Mumbai

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## ABSTRACT

**Background:** Non-communicable diseases (NCD) have emerged as the leading cause of morbidity and mortality. There are certain lifestyle related risk factors responsible for major NCDs. Lifestyle risk factors can be easily modified if detected early in life. Hence, this study was undertaken to find out the prevalence of such lifestyle related risk factors among adolescents.

**Method:** A cross-sectional study was carried out among adolescents. Data was collected by interview method using semi-structured questionnaire. Information was asked regarding tobacco and alcohol use, dietary practices, physical activity and family history of NCDs. Physical measurements were recorded using standardised methods. Statistical analysis was done using SPSS version 20.0.

**Results:** 227 adolescents participated in the study. 55 (24.2%) reported ever use of tobacco, of whom only 9 (3.9%) were females. No significant association was found between tobacco use and monthly per capita income. 23 (10.13%) of ever tobacco users were school dropouts. History of school dropout was significantly associated with tobacco use ( $p < 0.001$ ). Parental use of tobacco was significantly associated with tobacco use among the adolescents ( $p < 0.001$ ). None of the respondents reported alcohol use. Daily fruit consumption was reported by 1 (0.4%) respondent. Daily vegetable consumption was reported by 216 (95.2%) respondents. 36 (15.6%) reported doing vigorous activity for 60 minutes daily. 19 (8.4%) reported family history of NCDs. 15 (6.6%) were found to be overweight and 4 (1.8%) were found to be obese.

**Conclusion:** The study highlights high prevalence of lifestyle risk factors among adolescents which needs to be corrected.

**Keywords:** Non-communicable diseases, adolescents, lifestyle, physical activity, tobacco

## INTRODUCTION

Non-communicable diseases have shown increasing trends all over the world since last few decades. According to global estimates, mortality patterns have changed since the 1990s, with chronic non-communicable diseases (NCD) exceeding communicable, maternal and perinatal

causes, except in Sub-Saharan Africa. Globally, deaths from non-communicable diseases are expected to climb to 49.7 million in 2020, an increase of 77% in absolute numbers and increase in their share of the total from 55% in 1990 to 73% in 2020.<sup>1</sup>

The growing per capita income and resultant raised standard of living in developing countries has brought in the gamut of non-communicable diseases. These developing countries are fighting the menace of both communicable and non-communicable diseases with limited resources. As a result, a great number of premature deaths are happening in these countries. The non-communicable diseases present substantial challenge in present scenario.

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These non-communicable diseases are the consequence of genetic, environmental and lifestyle related risk factors. The major NCDs like cardiovascular diseases, cancer, chronic obstructive pulmonary disease and diabetes mellitus share common, preventable life style risk factors like tobacco use, unhealthy diet and physical inactivity.<sup>2</sup> The risk factors of today will cause non-communicable diseases tomorrow. Therefore, it is necessary to control the risk factors to avoid future burden of morbidity and mortality.

For the worldwide surveillance of risk factors for non-communicable diseases, the World Health Organisation (WHO) has devised the STEP wise approach to surveillance (STEPS). The WHO STEP wise approach for NCD risk factor surveillance is a sequential process, starting with gathering information on key risk factors by the use of questionnaires (STEP 1), then moving to simple, physical measurements (STEP 2), and only then recommending the collection of blood samples for biochemical assessment (STEP 3).<sup>3</sup> A few countries such as Indonesia and Vietnam have reported risk factors for NCDs using the WHO STEPS methodology. These studies did not include the STEP 3 component, which is expensive and logistically difficult to implement in low-resource settings. Moreover, most of the information on major risk factors can possibly be obtained using STEPS 1 and 2, and it is thought that a large proportion of the biochemical risk factors could be predicted. Therefore, the real need for STEP 3 data collection needs to be evaluated in community-based settings in developing countries.<sup>4</sup>

Another such questionnaire designed for school children aged 13-17 years is the global school-based student health survey (GSHS). It uses a standardised scientific sample selection process; common school-based methodology & core questionnaire modules; core-expanded questions and country specific questions that are combined to form a self-administered questionnaire which can be administered during one regular class period. The 10 core questionnaire modules address the alcohol use, dietary behaviours, drug use, hygiene, mental health, physical activity, protective factors, sexual behaviours, tobacco use, violence and unintentional injury.<sup>5</sup>

The knowledge of lifestyle risk factors in adolescence is of utmost importance. It is the time when an individual lays down the foundation of future lifestyle. Imbibing good habits at this time will ensure a healthy lifestyle throughout adulthood. Adolescents are more amenable to changes in lifestyle.

With this in view, the present study was undertaken to find the prevalence of different lifestyle risk factors for non-communicable diseases among adolescents. Also, the adolescents belonging to families of class IV employees presented an opportunity to study an urban population with unique socio-demographic background.

## AIM

To find out the prevalence of different lifestyle related risk factors for non-communicable diseases among the respondents.

## OBJECTIVES

1. To describe the distribution of lifestyle related risk factors among the respondents.
2. To correlate between the prevalence of lifestyle related risk factors and socio-demographic characteristics of the respondents.

## METHOD

**Research setting and study area:** The study was carried out in the campus of Grant Medical College and Sir J. J. Group of Hospitals, Byculla, Mumbai. The study was undertaken after completion of all formalities. The necessary administrative permissions were sought.

**Study Design:** Cross-sectional study

**Study Population:** It comprised of the adolescents (10-19 years) residing in the quarters for class IV employees inside the campus of Grant Medical College, Mumbai.

**Inclusion Criteria:** 1. All adolescents (10-19 years) residing at quarters for class IV employees. 2. Willing to participate in the study.

**Exclusion Criteria:** 1. Adolescents with loco motor disability. 2. Adolescents who are diagnosed cases of endocrinological disorders.

**Sample Size and Sampling Method:** For this study, the universal sample was considered, i.e. all the adolescents (10-19 years) were included. The information regarding the location and number of class IV employee quarters was procured from the Public Works Department of the Grant Medical College, Mumbai. Door to door visits were made, enquiring about presence of adolescent (10-19 years) in the family residing in that particular quarter.



Adolescents were included in the study after obtaining their written consent along with their parents' consent wherever required. If the adolescent was not present at time of visit, suitable timing was sought and then interview conducted in following visit.

**Data Collection:** The interview was conducted inside the quarter after ensuring privacy. The respondents and their parents were introduced to the topic and purpose of study was explained to them in the language they understood. The data was collected with help of a structured questionnaire based on WHO STEPS and GSHS (Indian version) questionnaire. The physical measurements were made by the investigator after the interview. The questionnaire assessed following variables:

#### Socio-demographic and lifestyle related questions

1. Socio-demographic information
2. Tobacco use
3. Alcohol consumption
4. Dietary practices like fruit, vegetable intake & junk food consumption<sup>6</sup>
5. Physical activity<sup>7</sup>
6. Family history of chronic non-communicable diseases.

#### Physical measurements (using standardized methods)

1. Blood pressure
2. Height
3. Weight
4. BMI<sup>8</sup>

**Statistical analysis:** It was done using SPSS version 20.0. Results were depicted in tabular form and graphs were made wherever necessary. Mean and standard deviation were calculated. Chi square test was applied to test significant difference between two groups. A 'p' value of less than 0.05 was deemed statistically significant.

## RESULTS

The total number of respondents was 227. Age ranged from 10-19 years (mean 14.07, SD  $\pm$  2.849). Of the total respondents 93 (41%) were females and 134 (59%) were males. Educationwise, 164 (72.2%) were studying in school, 20 (8.8%) were studying in

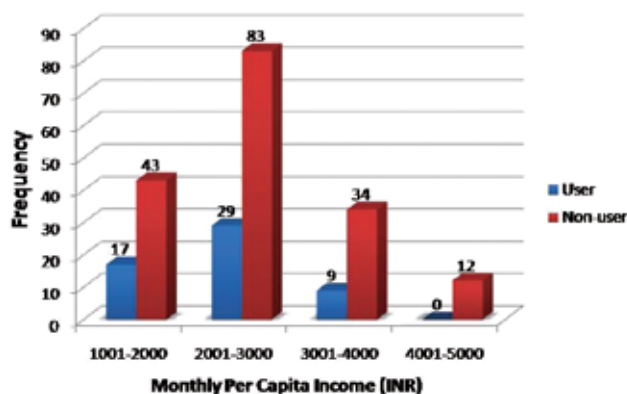
college and 43 (18.9%) were school dropouts. All the respondents belonged to lower socio-economic class according to modified Kuppaswamy's classification. Monthly per capita income varied from Rs. 1334 to Rs. 5000 (mean 2614.98 & SD  $\pm$  786.9).

**Table 1: Distribution of Respondents with respect to Gender and Tobacco Use**

Gender	Ever Used Tobacco		Total
	Yes	No	
Female	9 (3.96%)	84 (37.1%)	93 (40.9%)
Male	46 (20.2%)	88 (38.8%)	134 (59.0%)
Total	55 (24.2%)	172 (75.8%)	227 (100%)

Chi square= 18.171, d.f. =1, p<0.001, highly significant

In this study, 55 (24.2%) adolescents reported ever using tobacco products. Maximum tobacco use was seen in 17-19 year age group: 32 (58.18%). Tobacco use was found to be significantly higher in males as compared to females {46 (83.6%) vs 9 (16.3%).}



**Figure 1: Distribution of Tobacco Users with respect to Monthly Per Capita Income**

**Table 2: Association between Tobacco Use and History of School Dropout**

Category	Ever Used Tobacco		Total
	Yes	No	
Dropout	23 (10.13%)	20 (8.82%)	43 (18.95%)
Regular Students	32 (14.09%)	152 (66.96%)	184 (81.05%)
Total	55 (24.23%)	172 (75.77%)	227 (100.0%)

Chi square = 24.738, d.f.=1, p<0.001, highly significant

Majority of the ever tobacco users belonged to income group of Rs. 2001 to Rs. 3000. No significant association was found between per capita income and tobacco use. (Likelihood ratio= 7.620, d.f.=3, p=0.055, not significant)

Tobacco use was significantly associated with history of school drop-out.

Parental use of tobacco was found to be significantly associated with tobacco use in respondents. (Chi square = 69.756, d.f. = 1, p<0.001, highly significant).

12 (5.2%) acknowledged having experimented with smoking, 4 tried cigarette and 8 tried bidi; but none continued it regularly. 29 (12.8%) acknowledged having experimented with gutka (smokeless form of tobacco)

and 8 (3.5%) reported using it daily. 14 (6.16%) reported use of mishri (a smokeless form of tobacco), of whom 9 (64.2%) were females.

None reported ever consumption of alcohol.

Daily fruit consumption was reported by only one respondent. 37 (16.2%) reported consumption of fruit once a week. Daily vegetable consumption was reported by 216 (95.2%).

96 (42.3 %) reported consumption of junk food. Out of these, 33 (34.4%) reported consuming it more than thrice a week.

Only 36 (15.6%) of the respondents met the WHO recommendation for physical activity, of which 2 (2.2%) were females.

**Table 3: Distribution of Respondents with respect to Body Mass Index**

Categories Based On BMI	Gender		Total
	Male	Female	
Severe Thinness	12 (9.0%)	4 (4.3%)	16 (7.0%)
Thinness	13 (9.7%)	14 (15.1%)	27 (11.9%)
Normal	99 (73.9%)	66 (71.0%)	165 (72.7%)
Overweight	9 (6.7%)	6 (6.5%)	15 (6.6%)
Obese	1 (0.7%)	3 (3.2%)	4 (1.8%)
Total	134 (100.0%)	93 (100.0%)	227 (100.0%)

**Table 4: Age Vs Body Mass Index, Systolic Blood Pressure and Diastolic Blood Pressure**

Age	Body Mass Index	Systolic Blood Pressure	Diastolic Blood Pressure
Pearson's correlation value	0.527	0.670	0.674
P value	<0.0001	<0.0001	<0.0001
Significance	Significant	Significant	Significant
Total	227	227	227

19 (8.4%) reported having family history of non-communicable diseases.

None of the respondents were found to have raised blood pressure.

Age was found to be significantly associated with body mass index, systolic blood pressure and diastolic blood pressure.

**DISCUSSION**

In a study done by Akil Kant Singh et al, 50.5% boys and 48.5% girls said that they had a family history of

hypertension. Also, 22.9% boys and 29.9% girls stated that they had a family history of obesity.<sup>9</sup> In our study, only 8.4% reported family history of non-communicable diseases. Such low proportion can be attributed to the lower socio-economic status of the population studied.

In our study, 24.2% adolescents reported ever using tobacco products. This is much higher than the prevalence of 10.59% reported in a study done by Faizur Rahman and V. N. Tripathi among male adolescents.<sup>10</sup> The difference can be due to the inclusion of adolescents with diverse background in the latter study. In another such study done by Akil kant Singh et al, 3.6% boys

and 1.3% girls said they smoked more than once in the last one month.<sup>9</sup> C. Malhotra et al conducted a study on street children from Delhi and found that ever use of tobacco was 56.7%, much higher than that found in present study.<sup>11</sup>

Tobacco use in adolescents is due to their experimental and curious nature. Also they are ignorant about tobacco hazards. Such experimenters are prone to developing tobacco-related disorders at an early age. They have a greater probability of transforming themselves to regular and addictive users.

In our study, 12 (5.2%) experimented with smoking. 29 (12.8%) experimented with gutka (smokeless form of tobacco), of which 8 (3.5%) reported using it daily. 14 (6.16%) reported use of mishri (a smokeless form of tobacco), of whom 9 (64.2%) were females. Lesser proportion of females using tobacco may be due to the fact that females spend most of their time in domestic environment and so are less likely to be influenced by their peer group.

Tobacco use was significantly associated with history of school drop-out in our study. The greater use of tobacco in drop-outs may be due to deprivation of education and recreation which brings about a feeling of insecurity in them, leading them to take up addictions.

Another important factor found to be significantly associated with tobacco use among adolescents was parental use of tobacco. This association emphasizes the fact that parents are role models for their children. Such children take up the habit of tobacco assuming it to be normal and right.

Our study reported very low fruit consumption. This finding is reflective of the harmful dietary practices among the respondents. Similar finding was reported in a study among 6-11 year old children done by Mushi-Brunet et al. They observed that 78% of the children failed to meet the ideal fruit intake recommendation.<sup>12</sup> Another harmful dietary practice observed was consumption of junk food. In the present study, 96 (42.3 %) reported regular consumption of junk food.

## CONCLUSIONS

The present study depicts high prevalence of lifestyle related risk factors responsible for non-communicable diseases among the adolescents. Harmful practices

observed among the adolescents include tobacco use, inappropriate dietary practices and physical inactivity.

## RECOMMENDATIONS

Behaviour change should be brought about among the adolescents. They must be encouraged to follow healthy lifestyle. Also, the adolescents must be made aware of the consequences of unhealthy lifestyle. This may be done in following ways- 1. Health education regarding importance of healthy lifestyle can be given by arranging sessions inside the campus by the doctors of concerned tertiary hospital. 2. Posters can be displayed in the locality with the objective of serving as a reminder to target population that they ought to reconsider their harmful habits. 3. Skits can be performed by the medical students with an objective to clarify the prevalent superstitions and misconceptions about lifestyles. 4. Recreational facilities may be improved by formation of youth clubs and sports groups. Physical activity can be encouraged by formation of outdoor games club.

Health promotional measures, focussing not only the adolescent but the family as well, should be advocated in the community. Through proper initiative by the administration, parents-doctors meetings can be arranged. The hazards of lifestyle factors can be explained. The parents may be motivated to give up their habit of using tobacco and alcohol by making them realise that they are pushing their children towards such harmful habits. The persons willing to give up tobacco can be referred to the tobacco cessation clinics such as the one in Tata Memorial hospital.

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# Role of Curcumin in Chemoprevention of Oral Cancer: A Review

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## ABSTRACT

Chemoprevention is defined as the inhibition or reversal of carcinogenesis, a phenomenon that starts with alteration of normal cellular structure and terminates with cancer. There are many chemopreventive agents which are under trial for therapeutic use. Long-term use of most of the synthetic agents is associated with significant dose-related toxicity. Thereby the use of natural chemopreventive agents is desirable. This paper reviews one such natural agent curcumin which is used in chemoprevention of oral cancer.

**Keywords:** chemoprevention, cancer, curcumin

## INTRODUCTION

Chemoprevention is defined as the inhibition or reversal of carcinogenesis, a phenomenon that starts with normal cellular structure and terminates with cancer. The chemicals that inhibit the process of carcinogenesis are called as chemopreventive agents.

The main action of chemopreventive agents lies towards reversal of the process of potentially malignant disorders and inhibiting second primary tumors (SPT). This process of reversal of early precursor lesions and inhibiting second primary tumors will serve as an ideal approach for the treatment of oral cancer.

Pharmacological prevention of cancer is a newer approach in oncology, but it represents a very positive approach in the treatment of oral cancer<sup>1</sup>.

Chemopreventive agents are tried in several different malignancies, with some remarkable successes.

In the large randomized prospective trials, tamoxifen has shown promise in the treatment of breast cancer<sup>2</sup>.

Unlike other malignancies, oral cancer serves as a positive model to study chemopreventive agents for various reasons. It has well-established etiologic agents, namely tobacco, alcohol, betel nut chewing, and human papillomaviruses. Differences in the predisposing factors influence only the site prediction and do not affect the overall clinical picture. Oral cancer has known early precursor lesions such as leukoplakia, erythroplakia, and oral submucous fibrosis. Oral cancer has a conventional molecular progression model in which carcinogenesis is a multistep process from normal epithelium to dysplastic epithelium to carcinoma in situ and frank malignancy. The oral precursor lesions are easy to examine periodically for any morphologic alteration and can be confirmed by histopathologic examination. Several agents have been tried in various chemopreventive therapies. Since the earlier chemopreventive agents like retinoids were not considered safe and their low efficacy narrowed their use as a preventive agent. Because of long-term administration of chemopreventive agents, it is crucial to determine regimens that provide the greatest efficacy with least risk of adverse effects. The treatment of oral cancer is associated with the potential long term complications and hence, chemopreventive agents are regarded as a major therapeutic alternative. This review aims to encompass one such promising agent in the form of curcumin and discuss its role as a chemopreventive agent.

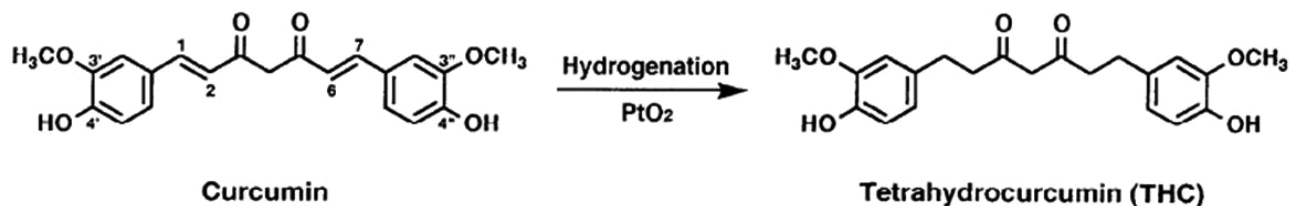
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Curcumin is a highly safe natural antioxidant with many possible biological properties. It has a wide array of applications and is considered a breakthrough in the management of oral cancer and various other malignancies.

**Tetrahydrocurcuminoids:** There are various metabolic products of curcumin. One of the most important metabolized by product is Tetrahydrocurcuminoids (THC). THC is the main agent involved in biological properties of curcumin.



Several studies on the absorption and metabolism of curcumin are reported in the literature. According to Holder et al.<sup>3</sup>, one of the main metabolites of curcumin is Tetrahydrocurcuminoids. Sugiyama Y et al.<sup>4</sup>, in their study, showed that THC had enhanced the inhibitory effect on lipid peroxidation than curcumin.

**Curcuma longa:** Natural plant products are home remedies for various common ailments since ages. However, their role as possible chemopreventive agents is still in its initial phase. In the recent decade, many trials are underway to explore the mechanism of plant products as a chemopreventive agent.

Curcumin (diferuloylmethane), a polyphenol, is an essential ingredient of the herb *Curcuma longa* (Commonly known as turmeric).

*Curcuma longa* is the main crop grown in Asians and tropical countries. This herb has a short stem measuring up to 1 metre height and tufted leaves. The parts used in therapeutics are the rhizomes.

**Chemical composition of turmeric:** The main curcuminoids existing in turmeric are:

- a. Demethoxycurcumin (Curcumin II)
- b. Bisdemethoxycurcumin (Curcumin III)

**Physical properties of curcumin:** Curcumin is insoluble in water but soluble in organic solvents. Primarily Curcumin exists in two forms as enol and  $\beta$ -diketone<sup>5,6</sup>. The enolic form of curcumin has a major role in the antioxidant ability. Curcumin is stable in gastrointestinal tract because of its slow degradation at pH 1-6. However one of metabolite of curcumin, Tetrahydrocurcumin, or THC is even stable at neutral pH<sup>6</sup>.

**Ancient applications of curcumin:** Historically, curcumin has been used as a food condiment and also carries therapeutic applications. In ancient medicine, curcumin and its metabolites are used in alternative medicine since ages. Ayurveda has laid special emphasis of curcumin in the treatment of asthma, allergy and upper respiratory tract infections.

In Chinese literature, it is mainly used to treat gastrointestinal diseases. The main therapeutic effect of curcumin and its products is because of its anti-inflammatory properties. The key aspect in its long-term use is extreme safety.

**Mechanism of action of curcumin:** The main interaction of curcumin at molecular level include various growth factors and regulatory genes of cell proliferation and apoptosis.

- (a) **Interacts with various receptors:** The main action of curcumin lies in its ability to inhibit tumor invasion and angiogenesis<sup>7</sup>. It attaches to multiple receptors and causes enzymatic inhibition.
- (b) **Inhibition of transcription factors:** Various transcription growth factors are responsible for carcinogenesis, cellular proliferation, and invasion<sup>8</sup>. Curcumin inhibits various transcription factors and inactivates the expression of genes that lead to cancer.
- (c) **Curcumin down regulates the activity of multiple kinases:** Curcumin's anti-proliferative activity is attributed to its inhibitory effect on many protein kinases<sup>9</sup>. Curcumin downregulates the expression of bcl-2 and thus suppress carcinogenesis.

**(d) Curcumin downregulates genes expressing growth and metastases:** Curcumin inhibits the metastatic activity of tumor cells by inhibiting the expression of matrix metalloproteinase (MMP-9) and MMP-2<sup>10</sup>. Curcumin is able to exert anti-inflammatory and growth-inhibitory action on tumor cells by inhibiting the activity of interleukin 1 $\beta$  (IL-1 $\beta$ ), interleukin 6 (IL-6), and TNF -  $\alpha$  and cyclin E<sup>11, 12</sup>.

#### **Preclinical studies of curcumin**

**(A) Curcumin as a chemopreventive agent:** The role of curcumin in chemoprevention of cancer has been examined in rodent models<sup>13</sup>. It has been proposed through these studies that curcumin can reportedly suppress the process of carcinogenesis in different cancers of the gastrointestinal, hematopoietic and oral cavity.

**(B) Anti proliferation of tumor cells:** Curcumin can inhibit various cancer cells including head and neck in vitro.

**(C) Curcumin exhibits antitumor activity in animals:** Kuttan et al.<sup>14</sup> first reported antitumor activity of curcumin in mice. Also, the effect of curcumin is enhanced by the simultaneous oral administration of green tea<sup>15</sup>.

**Clinical studies of curcumin:** To evaluate Curcumin's invitro and invivo chemopreventive and pharmacological efficacy, clinical trials have addressed the pharmacokinetics, safety, and efficacy of curcumin in humans.

**(A) Curcumin is extremely safe and well tolerated:** There are many studies which have evaluated the safety profile of curcumin as a chemopreventive agent.

**Deodar et al. (1980)** performed a short – term, double-blind, crossover study in 18 patients (age 22 to 48 years) to compare the antirheumatic activity of curcumin and phenylbutazone. They administered 1200 mg curcumin/day or 300 mg phenylbutazone/day for the duration of fourteen days. They concluded that curcumin was well tolerated with no side effects, and showed antirheumatic activity<sup>16</sup>.

**(B) Curcumin has anti-inflammatory and antirheumatic activity: Satoskar et al. (1986)** studied the anti-inflammatory attribute of curcumin

in patients with post-operative inflammation. They evaluated 46 male patients (between the ages of 15 and 68 years) having an inguinal hernia and hydrocele. These patients were prescribed either curcumin (400 mg) or placebo (250 mg lactose) or phenylbutazone (100 mg) thrice daily for 5 days from the first postoperative day. Curcumin was found to be safe, and phenylbutazone and curcumin produced better anti-inflammatory response than placebo<sup>17</sup>.

**(C) Role of curcumin in cancerous skin lesions: Kuttan et al. (1987)** evaluated curcumin's efficacy when applied as either an ethanol extract of turmeric or as an ointment to an external cancerous lesion in 62 patients. Regardless of the application, curcumin provided remarkable symptomatic relief that was in many cases relatively durable (lasting several months) and in all cases extremely safe<sup>18</sup>.

**(D) Curcumin is efficacious and safe in patients with inflammatory orbital pseudotumors: Lal et al. (2000)** evaluated the clinical effectiveness of curcumin in the treatment of patients with inflammatory orbital pseudotumors. In four out of five patients, complete recovery was observed. They concluded that curcumin was safe and efficacious drug in the management of inflammatory orbital pseudotumors<sup>19</sup>.

**(E) Role of curcumin in premalignant lesions:** Curcumin safely exerts chemopreventive effects on premalignant lesions.

**Cheng et al. (2001)** evaluated the pharmacological properties, safety and effective limiting dose in humans. This study examined patients with cancer of the urinary bladder, uterine cervix, skin, gastrointestinal and oral cavity. In 25 patients curcumin was administered orally for 3 months. Pre and post-treatment biopsy was undertaken to evaluate the histological improvement. This study concluded that curcumin is safe to humans at doses as high as 8000mg/day. The histological improvement seen in some cases also suggested a possible role of curcumin in chemoprevention of cancer<sup>20</sup>.

**(F) Curcumin modulates biomarkers of colorectal cancer: Sharma et al. (2001)** in their pilot study evaluated the pharmacological properties of curcumin. In this curcumin extract was given at

dose range from 440 and 2200 mg/day in fifteen patients. All the patients were diagnosed cases of advanced colorectal cancer and were given curcumin extract for 4 months. The end product measured were lipid peroxidation products and prostaglandins in blood. They found that curcumin was highly efficacious and safe. No curcumin residues were observed in urine or blood sample<sup>21</sup>.

## CONCLUSION

Curcumin has a likely role as a chemopreventive agent in the prevention of various malignancies. Its role in chemoprevention of oral cancer is still under trial. However various studies have pointed towards curcumin as an alternative in the management of oral cancer. Current treatment modalities are associated with significant dose-related toxicity, thereby necessitating the use of curcumin.

**Ethical Clearance:** Review article

**Source of Funding:** Nil

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# Breast Feeding Practices-An Exploratory Survey among Mothers of Infants

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## ABSTRACT

**Introduction:** Knowledge of breastfeeding is essential for every mother to ensure proper nutrition to their infants. In order to explore the feeding practices of mothers a survey was undertaken. The objective of the study was to find the breastfeeding practices of infants among the mothers attending a selected tertiary care unit of Udupi district.

**Method:** Research approach used for this study was quantitative survey with exploratory survey design. Hundred mothers selected using purposive sampling method were interviewed regarding the breastfeeding practices. The instruments used for the data collection were demographic proforma and a semi structured interview schedule. The setting of the study was a tertiary level hospital at Udupi District. This research protocol was approved by the Institutional ethical committee.

**Results:** Mean age of the mothers were 28.5 years and mean birthweight of the children were 2.53 kgs. Majority of the mothers delivered by caesarean section (63%). Only 46% of the mothers received information regarding breastfeeding before the delivery and health professionals were the main source of information to the mothers. Lactation counselling in the antenatal and postnatal areas carried out regularly by the health professional helped the mothers to receive the information from health professionals. Study showed that 65% of the mothers gave colostrum to their children. Only 33% of the mothers initiated breastfeeding within one hour of delivery.

**Conclusion:** Exclusive breastfeeding has advantage for the mother and the child. Lactation counselling by the health professional will help the mothers regarding breastfeeding. Continued support from the health professionals in postnatal period in the paediatric setting need to be reinforced. Mothers of infants need to be motivated for exclusive breastfeeding to their children.

**Keywords:** *breastfeeding, practices survey, infant, mother, south India*

## INTRODUCTION

Breastmilk is considered as the most appropriate and adequate nutrition for the infant till six months. Hence exclusive breastfeeding for the infant up to six months is

advised to the mothers. In reality there are infants who receive formula feed even from birth.

According to National Family Health Survey-3 data, about 20 million children are not able to receive exclusive breastfeeding (EBF) for the first six months, and about 13 million do not get good, timely and appropriate complementary feeding along with continued breastfeeding <sup>1</sup>.

The optimal and appropriate infant and young child nutrition practices and strategies recommended to practice reported in the Infant and Young Child Feeding Guideline of 2016 (IYCF) are a) Exclusive Breast Feeding (EBF) should be practiced till end of six

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months (180 days); b) After completion of six months, introduction of optimal complementary feeding should be practiced preferably with energy dense, homemade food; c) Breastfeeding should be continued minimum for 2 years and beyond; d) Mother should communicate, look into the eyes, touch and caress the baby while feeding. Practice responsive feeding; and e) WHO Growth Charts recommended for monitoring growth <sup>2</sup>.

Even though there are guidelines regarding IYCF, mothers do not follow exclusive breastfeeding is not followed in many countries <sup>3,4,5,6</sup>

The result of the cross sectional descriptive study carried out in Tamil Nadu showed a prevalence of the early Initiation of breast feeding as 97.5% and the prevalence of exclusive breast feeding in the study population was 68%. Inadequate exclusive breast feeding and the lack of hygienic feeding practices among the mothers were significantly associated with an increased incidence of upper and lower respiratory tract infections and gastro intestinal infections in the infants and the children <sup>7</sup>.

Breastfeeding and Immunization is an effective way of reducing child and maternal mortality. The results from study carried out in tertiary care hospital in Southern India showed that many participants had lacunae in knowledge and attitude and adequate health education should be given to the pregnant women <sup>8</sup>. In India, some of the barriers to exclusive breastfeeding reported from research include are lack of awareness regarding proper technique of breastfeeding and benefits of colostrum; breast abnormality like inverted/retracted nipples; obstetric/neonatal complications requiring specialised care; and cultural practices like giving pre-lacteals and gender discrimination <sup>9</sup>. Certain customs and beliefs also makes the mothers delay the initiation of breast feeding. Colostrum is considered as indigestible and not a good food for the baby <sup>10</sup>.

In order to understand more about the breastfeeding practices, an exploratory survey was carried out.

## MATERIAL AND METHOD

To identify the feeding practices of mothers of infants, a quantitative research method with an exploratory survey design was carried out in a tertiary care hospital of Udipi district. Mothers were selected based on purposive sampling. The data collection instruments included a demographic proforma and a semi structured interview schedule on infant feeding

practices. The content validity of the data collection instruments was established by seeking suggestion from five experts. After the validity, data collection instruments were pretested on three mothers. The reliability of the semi structured interview schedule was carried out by administering to 20 mothers and reliability coefficient was calculated by split half method. ( $r=0.86$ ). The data collection instruments were modified based on the pilot study carried out among ten mothers. The data for the main study was collected from October 2014 to July 2015. Mothers were informed about the purpose of the study and consent was taken. The information was collected among hundred mothers who attended the outpatient and inpatient department of Kasturba Hospital Manipal.

## ETHICS

The study protocol was approved by the Institutional Ethical committee of Kasturba Hospital Manipal. Written permission was obtained from the Paediatric department of Kasturba Hospital Manipal. Mothers were informed about the study and written informed consent was obtained before collecting the data.

**Statistics:** Data collected were analysed using SPSS version 16.0. Analysis was done by Chi square. The frequency and percentage was calculated for the variables related to sample characteristics and the demographic variables (**Table 1**)

## RESULTS

**Table 1: Sample characteristics of the mother and the children (n = 100)**

Variable	n & (%)
<b>Mother's age (in years)</b>	
20-30	72
31-40	27
41-43	01
<b>Occupation of the mother</b>	
Housewife	24
Working	76
<b>Type of family</b>	
Nuclear	74
Joint	26
<b>Type of delivery</b>	
Normal	37
Caesarean	63

Conted...

Birthweight of the child	
Less than 1 kg	05
1-2 kg	23
More than 2 kg	72

Mean age of the mothers were 28.5 years and mean birthweight of the children were 2.53 kgs. Majority of the mothers delivered by caesarean section (63%). Only 46% of the mothers received information regarding breastfeeding before the delivery and health professionals

were the main source of information to the mothers. Lactation counselling in the antenatal and postnatal areas carried out regularly by the health professional helped the mothers to receive the information form health professionals. Study showed that 65% of the mothers gave colostrum to their children. Only 33% of the mothers initiated breastfeeding within one hour of delivery.

**Information regarding breastfeeding:** Number mothers received information regarding breastfeeding was more (n=75) compared to before delivery (n=46). It was interesting to note that the main source of information was the health professions even in nuclear family. (Table 2).

**Table 2: Information received by the mother on breastfeeding based on family type (n = 100)**

Information received	Type of family			Total (%)
	Source	Nuclear	Joint	
Before delivery (46%)	Family members	07	01	08
	Health professional	29	09	38
After delivery (75%)	Family members	08	01	09
	Health professional	48	18	66

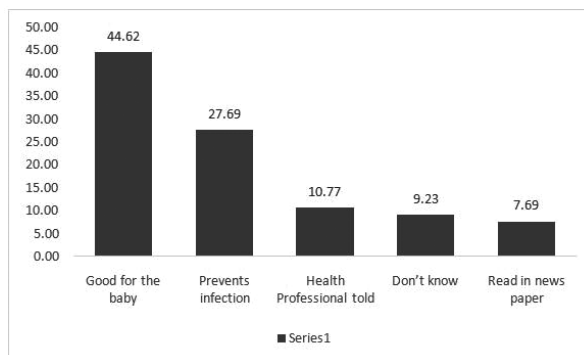
**Initiation of breastfeeding:** Out of 100 mothers, only 33% of the mothers initiated breastfeeding within half an hour of delivery and 65% of the mothers gave colostrum to the baby. Chi square test confirmed that timing of initiation of breastfeed was significantly associated with type of delivery ( $\chi^2=22.590, P=0.000$ ). The reasons given for not initiating the breastfeeding was caesarean section (27%), baby kept in NICU (8%) and 32% reported that they gave

the feed within 2 hours of delivery. Colostrum was not fed by 29% of the mothers who delivered by caesarean section compared to 6% of the mothers who delivered by normal delivery. Chi square test showed a significantly association between feeding colostrum to the baby with the type of delivery. The reasons for not giving colostrum were colostrum is dirty (3%), 15% felt that it is not good for baby and 17% said they do not know the reason (Table 3).

**Table 3: Initiation of breastfeeding by the mother based on type of delivery (n = 100)**

		Type of delivery		Total (%)	Chi <sup>2</sup>	p value
		Normal (%)	Caesarean (%)			
Breastfeeding within one hour	Yes	23	10	33	22.590	0.000
	No	14	53	67		
Feeding colostrum to the baby	Yes	31	34	65	9.108	0.002
	No	06	29	35		

**Reasons for giving the colostrum:** Mothers who gave colostrum to the baby were asked the reason why they gave colostrum to their babies. Majority of them expressed that colostrum is good for the baby (n=29; 44.62%) and helps in preventing infection (n=18; 27.69%) (Fig 1).



**Fig. 1: Reasons for giving Colostrum n = 65**

## DISCUSSION

A descriptive exploratory survey was carried out to find the feeding practices of mothers of infants in a tertiary care hospital of Southern India. This study showed that mothers received information regarding breastfeeding from the health professionals and the family members. This could be related to the lactation counselling in the maternal and children settings carried out by the nursing faculty who were trained in Infant and Young Child Feeding (IYCF) by Breast feeding Promotion Network of India (BPNI).

Infant and Young Child Feeding (IYCF, 2006) guidelines, recommends that initiation of breastfeeding should begin immediately after birth, preferably within one hour. This study showed that only 33% of the mothers breastfed the baby within one hour after the delivery. The similar findings were reported by a study carried out in coastal Andhra Pradesh (40.46%)<sup>11</sup>. This finding is lower than the study carried out in rural health training centre in Tamil Nadu where 97.5% of the mothers initiated breastfeeding within one hour of birth<sup>7</sup> and the NFHS-4 of Karnataka (56.4%)<sup>12</sup>. This finding is also similar to the findings in other country<sup>6,13,14</sup> as the institutional deliveries have increased, the responsibility of early initiation of breast feeding lies in the health care professional in the maternal and child health care centres. These findings indicate that the health professionals need to be aware of the IYCF guidelines and help mothers in following the guidelines.

Colostrum is good for the baby and to be recommended to be given to the babies. In this study, 65% of the mothers fed the colostrum to the babies within 2 hours after the birth. This finding is similar to the findings in the nearby state<sup>7</sup>. It is good to note that mothers were aware of the importance of giving colostrum to their baby. Out of 65%, 47% of the mothers gave the reason as good for baby and prevents infection. This show that the mothers were able to understand the benefit of colostrum to the baby's health.

## CONCLUSION

Importance of creating awareness among the health care professionals to be emphasized as there is increased number of deliveries in the health care settings. Health care professional should give importance to teach the mothers regarding all the recommendations given in

IYCF regarding breastfeeding. Exclusive breastfeeding has advantage for the mother and the child. Lactation counselling by the health professional will help the mothers regarding breastfeeding. Mothers have knowledge about the importance of giving colostrum to the babies. However, support from the health professionals in maternal and paediatric setting need to be emphasized. Mothers of infants need to be motivated for exclusive breastfeeding to their children.

**Ethical Clearance:** Taken from Institutional Ethic Committee (IEC) Kasturba Hospital, Manipal.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Comparative Study to Assess the Stress of Mothers of Preterm and Low Birth Weight Baby Admitted in NICU vs Postnatal Ward

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## ABSTRACT

The birth of a sick or premature baby is an acute emotional crisis for the parents. Many parents feel anxious guilty and also blaming themselves for the sick of their baby. In very preterm infants parental anxiety is often heightened by the appearance of the tiny and vulnerable baby. The potential uncertainty regarding the survival and ultimate health of very sick babies leads to intense distress with the level of depression experienced by parents. The present study is aim to assess the stress level of mothers of preterm and low birth weight baby admitted in NICU and post natal ward. This study was conducted at Retna hospital, marthandam. A sample of 60 mothers were selected using purposive sampling technique. Stress was assessed by using parental stress scale. Data were gathered by structured interview method. Data analysis was done by using descriptive and inferential statistics. the finding of the study stated that Mean value in NICU mother was 50.92 and in post natal mother it was 27.68, pair t test was 11.89. NICU baby mother had more stress compared with post natal ward mother.

**Keywords:** Preterm, Low birth weight baby. Neonatal Intensive Care Unit, Stress

## INTRODUCTION

Preterm birth and low birth weight baby remains a significant problem in maternal child health.<sup>1</sup> During pregnancy parents develop anticipatory set on the images of the child regarding sex, size and shape, condition, appearance and behavior. If there is a discrepancy between parental expectation and the reality of the appearance and behavior of new born such as prematurity and low birth baby, it may impair parental perception of newborn. Parents of preterm experience multiple stressor related to preterm birth, NICU admission in addition transition process to parenthood. Preterm birth and low birth weight baby remains a significant problem in maternal child health<sup>2</sup>

<sup>3</sup>Globally prematurity is the leading cause of death in children under the age of 5. Inequalities in survival rate around world are stark. Across 184 countries the rate of preterm birth ranges from 5% to 18%. More than 60% preterm birth occur in Africa and south Asia. In the lower- income countries, on average 12% of babies are born too early compared with 9% in higher- income countries. Preterm and low birth weight babies are 3-4 times greater risk of morbidity and mortality than the normal babies.

<sup>4</sup>The underlying causes of preterm birth are poorly understood, although stress hormone also involved in preterm delivery. Women with a previous premature birth, a multiple pregnancy (twins, triplets, or more), certain cervical or uterine abnormalities, and a number of medical conditions are at increased risk of preterm birth. Lifestyle factors also can elevate risk: these include late or no prenatal care, cigarette smoking, alcohol and illicit drug use, domestic violence, high stress levels, and prolonged work hours. The use of fertility medication that stimulates the ovary to release multiple eggs and of IVF with embryo transfer of multiple embryos has been implicated as an important factor in preterm birth.

<sup>5</sup>The environment of the neonatal intensive care unit (NICU) serves as a significant source of stress for parents. Neonatal units are often burdened with loud sounds, unpleasant sights and procedures, and crowds of health care professionals. Other sources of stress for parents of NICU infants have been found to be alterations in the parental role, uncertainty of the infant's outcome,

<sup>6</sup>After childbirth, women start to experience the postpartum period, which is the period in which the female body changes caused by pregnancy is returns to its

pre-pregnancy state. This period demands physiological and psychosocial care. Therefore women can foster self-care and at the same time parenting the preterm and low birth weight baby admitted in post natal ward are susceptible to postnatal emotional distress.

<sup>7</sup>Stress is a condition in which the human system responds to change in its normal balanced state. Stress results from challenges from environment. Stress affects the whole person in the entire human dimension. The perception of stress and response is highly individualized not only from person to person, but also from one time to another time. In addition each person's perception and response to stress are structured by his or her culture, family, genetic and life experience.

<sup>8</sup>Ronda PH et al., (2005) conducted a longitudinal cohort study to assess the maternal psychological stress and distress as predictors of LBW and prematurity. The findings of the study shown that maternal distress was associated with LBW and prematurity. There was an interaction between distress and smoking in the second interview. The study confirmed that distress is associated with low birth weight and GA.

Mothers of infants with preterm birth may experience increased stress related to feelings of helplessness, exclusion, and alternation and lack of sufficient knowledge regarding parenting and interaction with their infants. Additionally, prolonged hospitalization and infant complications associated with preterm birth may aggravate the mother's feelings of helplessness and further increase her level of stress.<sup>9</sup>The increased level of stress may thus impact a woman's ability to adjust or transition to motherhood, increasing her likelihood of experiencing postpartum depression. Health personal working in NICU and post natal ward must address their level of stress and provide intervention to the mother based on their level of stress. It alleviate their stress and feel more confident to tackle the situational stress and enhance self esteem.

### OBJECTIVES OF THE STUDY

- To assess the level of stress among the mothers of preterm and low birth weight baby in NICU and post natal ward
- To compare the stress level of mother of preterm and low birth weight babies in postnatal ward and NICU.

- To find out the association between the stress level of preterm and low birth weight baby mothers in NICU and postnatal ward with their selected demographic variables.

**Hypotheses:** There will be a significant difference between the level of stress among mothers of preterm and low birth weight baby admitted in NICU and postnatal ward.

### METHODOLOGY

**Research approach:** Research approach of this present study is descriptive in nature.

**Research design:** Research design of this study is non experimental research design.

**Research setting:** Retna hospital Marthandam, KanyaKumari district

**Sampling and sampling technique:** Sample were selected using purposive sampling technique. Totally 60 sample, 30 NICU mothers of preterm and low birth weight baby and 30 mothers in post natal ward.

### RESULTS AND DISCUSSION

Assessment of the stress level in the study group in NICU revealed that (40%) had moderate stress and (60) % had severe stress. The mean score of NICU mother mean score 50.92 and standard deviation was 7.31. Where as all the mothers of preterm and low birth weight baby in postnatal ward (100%) had mild stress and the postnatal ward mother mean score was 27.68 with the standard deviation of 6.78. So it indicated that mothers of preterm and low birth baby admitted in NICU, were suffer high and moderate level of stress than post natal ward mothers. The observed paired't' test value was 11.89 at the level of p value  $p < 0.05$  level.

The demographic variables like education, occupation, weight of baby and health status of baby in postnatal ward of preterm and low birth weight were associated with the level of p value  $p < 0.05$  level. In regards to demographic variables of NICU, mothers of preterm and low birth weight only education of mother was associated with the p value of  $p < 0.05$  level. All the other demographic variables are not associated with stress



## CONCLUSION

The study findings revealed that there was highly significant difference in the level of stress among NICU and post natal ward mother. So NICU mothers need some kind of intervention to reduce the stress. Health personal working in NICU must assess the stress and provide adequate psychological support or coping strategic will help them to overcome their problem and lead quality life.

**Ethical Clearance:** Taken from Rethna hospital, Swamiyarmadam, Marthandam

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Eat Out Habits of Individuals With Reference to Ernakulam Metro City

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## ABSTRACT

Economy is growing at a tremendous pace. The rising disposable income of the population has totally changed the consumption pattern of tasting foods from various eateries. This has absolutely affected the health as well as the wealth of the population of Ernakulam Metro city. Present study analyses the eat out habits of the people belonging to Ernakulam metro district.

**Keywords:** *Eat outs, Cultural Influence, Fast food, Consumer behavior, consumption pattern.*

## INTRODUCTION

Kerala's eating habit is closely associated with its history geography culture etc. Kerala food offers a wide variety of vegetarian and non vegetarian food patterns. Muslim and Christian community has offered unique non vegetarian dishes to Kerala cuisine. Meat eating habits were limited by religious taboos especially Hindus. Previously this was the situation but presently most of Hindus prefer to eat non vegetarian too. But Muslims don't consume pork and other items which are banned by Islamic law.

Fast food chains are quite common in Kerala. Though Kerala has maintained its traditional uniqueness, it is also modern in its own manner. Most popular fast food joints in Kerala are found along with the local ones that offer their own array of fast food and other snacks. Apart from the fast food joints, number of bars, pubs and coffee joints are mostly found in various cities of Kerala. Eating out at least once a week has become an accepted standard, said cardiologist Jaideep Menon, practicing in Angamaly<sup>1</sup>.

To eat out means to spend time with friends and families by sharing food in restaurant or food court. Number of new restaurants is being opened in various parts of cities and towns. This itself will create urge among people to have food from outside. The city and towns seem to be fully crowded all the time irrespective of rural and urban area. Previously if a guest arrives in a family the common practice was to prepare food at home but presently the situation is totally different.

People prefer to eat food from outside with friends, relatives and all. Thus it is affecting the culture of the economy. People are adopting western culture of eating which does not suite our environment. The change in the standard of living and income level of people may be the reason for this changing consumer behavior. To maintain healthy balance, adolescents, should practice eating regular meals, engage in doing compulsory daily physical activity, and eating a wide variety of foods<sup>2</sup>.

**Statement of the Problem:** The eating out habits of people is increasing day by day. Huge money is invested for the same. Because of this continuous eating habit has affected the family relationships and even health hazards have been increased. So a study relating to the eating habits of people belong to Ernakulam city is found to be important.

## OBJECTIVE

Present study aims to analyze the eat out habits of people belonging to Ernakulam district and also to understand factors responsible for the same.

## MATERIALS AND METHOD

**Research Methodology:** The study is descriptive in nature. Primary and Secondary data is used for the study. Questionnaire and discussion with the respondents was the major source of collecting Primary data. Various Secondary sources like research articles and other references also form part of the study. For the purpose of analysis a sample of 76 individuals was chosen based

on convenience sampling method from the Ernakulam district. For the purpose of deriving output various analytical tools like frequency, correlations and cross tabulation is used for the study.

**ANALYSIS AND INTERPRETATION**

Majority of the respondents of the study was focused between the age group of 20-30 and the least groups were found between 41-50 and 51-60 years. The data for the study was collected from students, professionals, self employed and house wives category. Nearly 47 percent was students and 36.8 percent was professionals and 15.8 percentages was self employed. Only 2.6 percentages was house wives. Male category was more constituted which comes nearly 77.6 percentages. From this 75percentage were single and 25 percentages were married. The study shows that about 69.7 percentages used their own vehicles to travel for eat out purpose.

While considering the various meals of the day preferred to eat outside, it is found that the highest score is for Dinner and the least preferred is breakfast. This proves that people mostly goes out to eat dinner rather than lunch and breakfast.

Study also explains that while people taking a decision to eat out the most preferred factor is the taste of food after that they are bothered about the payment options offered, brand perception, presentation of food, menu item variety etc. The least concerned factor is promotional offers, price of food, cleanliness of the restaurant etc. So from this it is clear that the main

intention behind eating out is to eat tasty and variety food with friends and families. Price of food is given least importance. Thus money is not a matter here.

While counting the number of times people going for eat outs in a week it is found that nearly 59.2 percentages are going 1-3 times in a week and nearly 22.4 percentages are going out 4-6 times is a week for eat outs. This shows that the frequency of going out to have food is very high. They prefer more to eat food from restaurants and fast food corners rather than home delivery and dhaba. People prefer to eat food with family (42 percent) and friends (39.5 percent) more rather than others.

The spending habits of the sample shows that nearly Rs 300 to Rs 1200 are spend weekly for eat out purpose. This shows a huge investment of money for eating out among students and professionals. While analyzing the reason for eats outs it was found that the main reason was to spend time with friends and family and also as to engage the leisure time and also because of no option of home cooked food. This is mainly followed by students and working professionals. Their preference to eat outs is any day irrespective of weekends or weekdays. Thus it is not limited to any occasions.

While considering factors they prefer more while deciding to eat out, it is found that more preference is given to the brand, then the friends circle, then the location and the service provided.

**Hypothesis tested**

**H0:** There exist a relationship between categories of eateries they visit and availability of own vehicle.

**Table No. 1: Own Vehicle \* Categories of Eateries Visit Most**

Own Vehicle * Categories of Eateries Visit Most Crosstabulation							
Count		Categories of Eateries Visit Most					Total
		Restaurant	Fast Food	Food Court	Dhaba	Home Delievery	
Own Vehicle	Yes	26	14	6	3	4	53
	No	8	11	0	2	2	23
Total		34	25	6	5	6	76

**Table No. 2: Own Vehicle \* Categories of Eateries Visit Most**

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-Sided)
Pearson Chi-Square	5.821 <sup>A</sup>	4	.213

Conted...

Likelihood Ratio	7.423	4	.115
Linear-By-Linear Association	.164	1	.685
N Of Valid Cases	76		

**Table No. 3: Own Vehicle \* Categories Of Eateries Visit Most**

Correlations			
		Categories of Eateries Visit Most	Own Vehicle
Categories of Eateries Visit Most	Pearson Correlation	1	.047
	Sig. (2-Tailed)		.688
	N	76	76
Own Vehicle	Pearson Correlation	.047	1
	Sig. (2-Tailed)	.688	
	N	76	76

The study shows that Chi square value of 5.821(df =4, N 76), P>0.05 is not significant at 4 degree of freedom, showing that there exist a relationship between own vehicle and categories of eateries visit. Thus the null hypothesis is accepted. The bivariate correlation is undertaken between the respondents and it is hypothesized that a relationship exists between availability of vehicle and categories of eateries visit. The results show a negative relationship between the variable (r=.047,P>.05). Based on the availability of vehicles people prefer to eat food outside.

**H0:** There exist a relationship between spending per week on eating out and number of times going out for eat outs.

**Table No. 4: Spending Per Week on Eating Out \* Number of Times**

Spending Per Week on Eating Out * Number of Times Crosstabulation						
Count		Nnumber of Times				Total
		1-3	4-6	7-9	10-12	
Spending Per Week on Eating Out	0-300	8	0	0	0	8
	301-600	14	3	1	3	21
	601-900	10	3	1	1	15
	901-1200	8	3	3	3	17
	1201-1500	1	5	0	0	6
	1500+	4	3	1	1	9
Total		45	17	6	8	76

**Table No. 5: Spending Per Week on Eating Out \* Number of Times**

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	24.589 <sup>a</sup>	15	.056
Likelihood Ratio	24.621	15	.055
Linear-by-Linear Association	3.549	1	.060
N of Valid Cases	76		

**Table No. 6: Spending Per Week on Eating Out \* Number of Times**

Correlations			
		Spending Per Week on Eating Out	Nnumber of Times
Spending Per Week on Eating Out	Pearson Correlation	1	.218
	Sig. (2-Tailed)		.059
	N	76	76
Nnumber of Times	Pearson Correlation	.218	1
	Sig. (2-Tailed)	.059	
	N	76	76

The study shows that Chi square value of 24.589 (df =15, N 76),  $P>0.05$  is not significant at 4 degree of freedom, showing that there exist a relationship between spending per week on eating out and number of times going out for eat outs. Thus the null hypothesis is accepted. The bivariate correlation is undertaken between the respondents and it is hypothesized that a relationship exists between availability of vehicle and categories of eateries visit. The results show a negative relationship between the variable ( $r=.047, P>.05$ ). Majority are prefers to eat out nearly one to three times per week and spending more than 1000 rupees per week.

### FINDINGS

Majority of the respondents of the study was focused between the age group of 20-30 and the least groups were found between 41-50 and 51-60 years. The data for the study was collected from students, professionals, self employed and house wives category. Nearly 47 percent was students and 36.8 percent was professionals and 15.8 percentages was self employed. Only 2.6 percentages was house wives. Male category was more constituted which comes nearly 77.6 percentages. From this 75percentage were single and 25 percentages were married. The study shows that about 69.7 percentages used their own vehicles to travel for eat out purpose.

While considering the various meals of the day preferred to eat outside, it is found that the highest score is for Dinner and the least preferred is breakfast. This proves that people mostly goes out to eat dinner rather than lunch and breakfast. Table explains that while people taking a decision to eat out the most preferred factor is the taste of food after that they are bothered about the payment options offered, brand perception, presentation of food, menu item variety etc. The least concerned factor is promotional offers, price of food, cleanliness of the restaurant etc. So from this it is clear that the main intention behind eating out is to eat tasty and variety food with friends and families. Price of food is given least importance. Thus money is not a matter here. While counting the number of times people going for eat outs in a week it is found that nearly 59.2 percentages are going 1-3 times in a week and nearly 22.4 percentages are going out 4-6 times is a week for eat outs. This shows that the frequency of going out to have food is very high. They prefer more to eat food from restaurants and fast food corners rather than home delivery and dhaba. People prefer to eat food with family (42 percent) and friends (39.5 percent) more rather than others.

The spending habits of the sample shows that nearly Rs 300 to Rs 1200 are spend weekly for eat out purpose. This shows a huge investment of money for eating out among students and professionals. While analyzing the reason for eats outs it was found that the main reason was to spend time with friends and family and also as to engage the leisure time and also because of no option of home cooked food. This is mainly followed by students and working professionals. Their preference to eat outs is any day irrespective of weekends or weekdays.

While considering factors they prefer more while deciding to eat out, it is found that more preference is given to the brand, then the friends circle, then the location and the service provided. The study shows that Chi square value of 5.821(df =4, N 76),  $P>0.05$  is not significant at 4 degree of freedom, showing that there exist a relationship between own vehicle and categories of eateries visit. Thus the null hypothesis is accepted. The bivariate correlation is undertaken between the respondents and it is hypothesized that a relationship exists between availability of vehicle and categories of eateries visit. The results show a negative relationship between the variable ( $r=.047, P>.05$ ). Based on the availability of vehicles people prefer to eat food outside.

### DISCUSSION AND CONCLUSIONS

Present study shows that the habit of eating food from outside has increased tremendously irrespective of gender, education, profession, income etc. This routine habit will lead to a deadly and nutrients deficiency diseases like non communicable diseases, obesity among men and women, increased number of heat diseases because of the consumption of fatty and junk foods, deep fried items by reusing the oils may lead to cancerous diseases. Taking food from outside may even lead to premature hypertension, lipid and diabetic problems in early stage of life.

Continuously taking food from outside with friends and colleagues may even affect the family relationship and the environment. Since Kerala has a good tradition of culture and values which were followed by the ancestors need to be considered and should be preserved and protected. So the changing habits of youngsters will definitely hamper such belief. Occasionally having food from outside is considerable good but more than 3 to 4 times a week is not good and safe. A healthy body needs a wealthy habit of taking food prepared in homely environment.

**Ethical Clearance:** Nil

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Women's Health in Midlife: Factors Influencing Menopausal Symptoms among Rural Women in Tiruvallur District of Tamilnadu

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## ABSTRACT

**Context:** Menopause is both an objective hormonal event and a subjectively perceived endocrine transition. The degree of symptomatology experienced by an individual woman can be influenced by a number of factors, including age at menopause and psychosocial attitude towards menopause.

**Objective:** To estimate the various symptoms that occur during the menopausal period and to determine the various factors like sociodemographic details influencing menopausal symptoms among postmenopausal women in a rural population in Tiruvallur district in Tamil Nadu.

**Methodology:** A Cross sectional study was conducted among 780 postmenopausal women using cluster sampling method. Descriptive statistics was calculated for all background variables. Univariate analysis was done using Chi square test.

**Results:** The mean age of the 780 post menopausal women included in the study was 50.20 years. Their mean ages at menarche and at menopause were 12.16 years and 44.49 years respectively. 475 (61%) experienced vasomotor symptoms, 193 (24.7%) reported depressive mood, 276 (35.4%) reported anxiety, irritability was reported by 71 (9.1%) and sleep related problems were reported by 313 (40.1%) women. Vasomotor symptoms were reported more among those with duration of menopause > 8 years (P<0.05).

**Conclusion:** Postmenopausal women face a volley of health problems that needs to be addressed through proper therapy & counselling services.

**Keywords:** Anxiety, Depression, Irritability, Menopause, Menopausal Symptoms, Postmenopausal women.

## INTRODUCTION

In most societies, menopause marks a turning point in a woman's life. The implications of reaching

menopause vary from one society to another depending on the political and economic structure of each society and the condition of life it provides for women of all ages, including their access to health care<sup>1</sup>. It is generally accepted that the average age at menopause is about 51 years in industrialized countries, but in developing countries, it ranges from 43 to 49 years<sup>2</sup>. Menopause is both an objective hormonal event and a subjectively perceived endocrine transition.

In India, sixty million women are above the age of 55 years. With women living longer than before,

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majority would spend one third of their life in the post menopausal stage. The health problems cropping up during this period and related to oestrogen deficiency of menopause are now obvious and better understood. It is important therefore to address all these menopause related symptoms and apply prophylactic measures so that these women can lead an enjoyable and healthy life<sup>3</sup>.

Most of the information on symptoms of menopause has been obtained from the populations in industrialized countries and sparse information is available from the countries like India<sup>2</sup>. In the Northern parts of India, there are population based studies which have been done in the rural areas on postmenopausal symptoms, but in Southern India no such studies have been done on rural areas. This study is an attempt to document the various symptoms that occur during the menopausal period and to study the various factors like age, education, occupation, marital status etc., influencing the menopausal symptoms among postmenopausal women in a rural population in Poonamallee block of Tiruvallur district in Tamil Nadu.

### METHODOLOGY

This population based Cross sectional study was conducted among the rural population in Poonamallee block of Tiruvallur district in Tamilnadu over a period of 4 months between July to October 2010. The Poonamallee block comprises of 160 villages with a population of 172300 people in 34460 households.

The study population included only women who had attained natural menopause and had their last menstrual bleeding at least one year prior to data collection. Women who were in the transitional period of attaining menopause and those who had undergone hysterectomy due to any cause were excluded from the study.

Based on the anticipated prevalence of hot flushes among menopausal women as 50%, with an alpha error of 0.05, the limit of accuracy of 10 % and a design effect of 2, the minimum sample size required for the study was 769. The sampling interval worked out was 25.63. Accordingly, 26 postmenopausal women were selected from each cluster. The final sample size arrived at was 780.

**Sampling Method:** A list of all villages and their corresponding population in Poonamallee block was obtained. There were 160 villages. Villages with small

population were clubbed with the adjoining villages so that each cluster had a minimum of 1000 population and a list of 105 village clusters and their corresponding population was made. The cumulative population list of the 105 clusters was prepared and 30 clusters were randomly selected by Probability Proportionate to Size (PPS) method

### DATA COLLECTION

Permission was obtained from the Institutional Ethics Committee. Data was collected using a pretested, structured questionnaire. A Written informed consent was obtained from study participants prior to the conduct of study.

### DATA ANALYSIS

Data entry and analysis was done using statistical package for social sciences (SPSS) version 16 software. Descriptive statistics was calculated for all background variables. Univariate analysis was done using Chi square test to find the association between factors.

**Table 1: Background characteristics of postmenopausal women**

No.	Background Characteristics	Total no of participant (N = 780)	Percentage
1.	<b>Age of the participants (years)</b>		
	<45	20	2.6
	45-55	706	90.5
	>55	54	6.9
	Total	780	100
2.	<b>Socioeconomic status based on standard of living index</b>		
	Low	566	72.6
	Medium	211	27.0
	High	3	0.4
3.	<b>Education</b>		
	Illiterates	7	0.9
	Primary	7	0.9
	Middle school	229	29.4
	High school	366	46.9
	Graduation	86	11
	Post Graduation	85	10.9



Conted...

<b>4. Occupation</b>	Unskilled	3	0.4
	Semiskilled	615	78.9
	Skilled	37	4.7
	Professional	125	16
<b>5. Marital status</b>	Unmarried	78	10
	Married	672	86.1
	Widows	13	1.7
	Separated/ Divorce	17	2.2
	<b>6. Age at menarche (years)</b>		
<12	379	48.6	
12-14	395	50.6	
>14	6	0.8	
<b>7. Age at menopause (years)</b>	<40	78	10
	40 -45	321	41.2
	>45	381	48.8
<b>8. Duration of menopause (years)</b>	<5	140	17.95
	5-10	388	49.75
	>10	252	32.30

## RESULTS

Background characteristics: The Background characteristics of the participants are described in table 1. The mean age of the study participants was 50.20 years and median was 50 years. Their mean ages at menarche and at menopause were 12.16 years and 44.49 years respectively.

**Table 2: Association between duration of menopause with vasomotor symptoms**

Duration of menopause	N = 780	Postmenopausal women with Vasomotor symptoms	
		Present	OR (95% CI) P value
≤8 years	316	206 (65.2%)	1.36 (1.01-1.82)
>8 years	464	269 (58%)	0.043

**Table 3: Association between marital status & irritability**

Marital status	N = 780	Postmenopausal women with irritability	
		Present	OR (95% CI) P value
Unmarried/widow/ divorced	108	17 (15.7%)	2.13 (1.18-3.84)
Married	672	54 (8%)	0.010

**Post menopausal symptoms:** All the Post menopausal women included in the study were enquired about the presence of various menopausal symptoms. Those women experiencing either of the symptoms viz. hot flush & night sweats were considered having vasomotor symptoms. 475 (61%) experienced vasomotor symptoms- Hot flushes was reported by 325(41.7%) & night sweat was reported by 342 (43.8%) post menopausal women. 193 (24.7%) women reported having experienced symptoms of depressive mood like feeling sad, hopeless, helpless, and worthless. Anxiety either in the form of inner restlessness or feeling panicky was reported by 276 (35.4%). Irritability was reported by 71 (9.1%). Sleep related problems i.e., either difficulty in falling asleep or sleeping through, were reported by 313 (40.1%) women. Burning sensation while passing urine was reported by 58 (7.4%), increased frequency was reported by 46 (5.8%) and difficult to hold urine by 62 (7.9%) women. Overall, 91 (11.7%) post menopausal women had reported atleast one these above mentioned urinary symptoms. Joint pain was reported by 156 (20%) women. Irritability was found to be more among unmarried/ widowed/divorced postmenopausal women compared to married women. This was found to be statistically significant (P 0.010). Vasomotor symptoms were found to be more among those with longer duration of menopause & this was found to be significant (P 0.043). (Table 2 & 3)

## DISCUSSION

In the current study, the age of the participants ranged from 40 to 58 years with the mean age of 50.2 years and median age of 50 years. Jahanfar Sha et al<sup>4</sup> showed the mean age of the study participants to be 51.2 years and median 51 years which is comparable to the current study. A study done in Chandigarh<sup>5</sup>, involved post

menopausal women aged 35-55 years. Another study by in Punjab<sup>2</sup>, included post menopausal women aged 40-50 years. Majority of the women (86.1%) were currently married in our study. In the study done in Malaysia<sup>4</sup> majority of the post menopausal women were married (83%). The proportion of women living in nuclear families was 48.9% and that living in joint families was 51.1%. In 2005, a study done in Chandigarh<sup>5</sup> showed 34.9% were in nuclear families and 65.1% of the women were staying in joint families. This difference could be due to the impact of changing trend in the family pattern. It also reported the mean age at menopause as 44.1 years similar to our study.

Overall 61% post menopausal women reported vasomotor symptoms (combined hot flushes and night sweats) in the present study. A study by Karmakar et al (2017)<sup>6</sup> reported a similar finding of vasomotor symptoms (60%) among post menopausal women. In another study the prevalence of vasomotor symptoms was reported as 67.1% and showed that there were no difference between menopausal symptoms and different marital status (P value = 0.934).<sup>4</sup> According to Sharda Sidhu et al<sup>2</sup> the prevalence of vasomotor symptoms was 55.08% and this symptom are related to aging process or occur because of the stresses in midlife years which was comparable to the present study. Shaw et al<sup>3</sup> reported the prevalence of vasomotor symptoms as 85% which is much higher than the current study. In the present study, the prevalence of hot flushes among post menopausal women was 41.7% while other studies have reported as 50%<sup>5</sup> and 17%<sup>7</sup>. The prevalence of night sweats in the present study was 43.8% while other studies from Chandigarh reported 18.8%<sup>7</sup> and 48%<sup>5</sup>. The prevalence of hot flushes and night sweats vary widely among women of different geographic region and also by ethnicity. The differences may be due to the influence of a range of factors, including climate, diet, lifestyle, women's roles, and attitudes regarding the end of reproductive life and age.

The prevalence of depressive moods in the present study was more (24.7%) compared to a study done by Tamaria et al (23.5%)<sup>8</sup>, Sharda Sidhu et al<sup>2</sup> (8.20%), Kaur et al<sup>7</sup>(10.6%) and Singh et al<sup>5</sup> (13.8%). The above difference may be due to family problems, like alcohol use by husband, negligence by the family members, children not established in life and monetary problems like no savings, poverty etc. which was commonly seen in the present study. It is likely that other factors were

influencing the development of depressive mood, such as normal aging process, or possibly mid life crisis and many other non menopausal factors experienced by women 45-65 years of age<sup>4</sup>.

In the present study the prevalence of anxiety among post menopausal women was 35.4%. A study done in Australia by Israt Hafiz et al<sup>9</sup> reported anxiety among postmenopausal women to be 32.8%, which was comparable to the present study. Other studies reported anxiety level as high as 71.4%<sup>4</sup> and as low as 22.26%<sup>2</sup>. These differences may be due to the economic status or other social factors which indirectly affect health of the post menopausal women. A study done in Japan<sup>10</sup> showed that working post menopausal women suffered more from anxiety than others.

It was found in the present study that 9.1% of the postmenopausal women had irritability. Study in Malaysia<sup>4</sup> reported the prevalence of irritability very high (65.7%). Studies from Punjab<sup>2</sup> & Delhi<sup>11</sup> reported irritability during post menopausal period to be 35.2% & 41.7% while another reported much lower levels (6.5%)<sup>5</sup>. In both of these studies, method of assessment of irritability has not been described. In the present study irritability was assessed as per method used by Jahanfar et al<sup>4</sup>. Irritability was found to be higher among unmarried, widowhood and divorced women (15.7%) compared to married women (8%) and also found to have 2.13 times greater risk of developing irritability. The difference was found to be statistically significant (P value = 0.010). A study done by Agwu et al<sup>12</sup> in Nigeria, showed that unmarried, widowed and divorced women were less able to cope with irritability.

The prevalence of sleep related symptoms was 40.1%. In a study done in Chandigarh<sup>5</sup>, sleep related symptoms were noted among 36.8% women. Another study done in Punjab<sup>2</sup>, India, sleep disturbance was reported as 53.12% and have stated that these symptoms were related to aging process or occur because of the stresses in midlife years which was comparable to the present study. In a study conducted in Chandigarh<sup>7</sup>, sleep related symptoms was reported as 18.8%. Singh A et al (2014) found a higher prevalence of sleep related symptoms (62.7%) among post menopausal women in Delhi.<sup>11</sup> A systematic review by Jehan et al (2015) reported a prevalence of sleep disturbance between 35% to 60%.<sup>13</sup>

In a study conducted by Singh et al<sup>5</sup> in Chandigarh, the prevalence of urinary symptoms was reported by 15.7%. A study done by Kaur et al<sup>7</sup> in Chandigarh, the urinary symptoms was reported by 10.6% which was comparable to the present study (11.7%). The difference observed between areas and regions may be due to women's attitude towards health and the related behaviour. According to Jung BH et al<sup>14</sup> in Korea showed that major hormone dependent post menopausal symptom was urinary symptom. A study done by Perrotta C et al<sup>15</sup> showed that the risk of urinary symptoms was associated with decrease in estrogen levels during post menopausal period.

In our study the symptoms of joint pain was reported by 20% of the post menopausal women. A study done by Agwu et al<sup>12</sup> in Nigeria, the prevalence of joint pain was reported as 25.8%. According to Study done by Singh et al<sup>5</sup> Chandigarh, India; joint pain was noted in 9.2% of post menopausal women which was low compared to the present study. This difference could have been due to variations in food patterns in different communities and the amount of physical activities. Study reviewed by Israt Hafiz et al<sup>9</sup> found that joint pain were multi factorial in nature and could be the result of health problems associated with ageing and mid life crises experienced by women in the age group 40–60 years. It had also been suggested that social, psychological and health factors may be responsible for somatic and psychological symptoms, rather than hormonal disturbances.

## CONCLUSION & RECOMMENDATIONS

Menopause is an important stage within the continuum of the health in a women's life, has gained a lot of attention since the last century. The study participants experienced a variety of symptoms, both due to menopause and because of aging. Although for some woman the post menopausal period was smooth but most of the women suffered from unpleasant symptoms like vasomotor symptoms, anxiety, irritability, sleep problems etc. Hence, these problems needs to be addressed through proper therapy & counselling services. Health education may be given to these postmenopausal women regarding various treatment modalities available. They must also be encouraged to have a stress free lifestyle & healthy dietary habits. Psychiatrists & psychologists may be involved to offer counselling services to those postmenopausal women who are in need of them.

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# Review of Burden of Risk Factors of Coronary Heart Disease in India

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## ABSTRACT

India is experiencing epidemiologic transition with sharp increase in coronary heart disease. Fatality rate of CHD is alarmingly high leading to most common cause of premature mortality in year 2016. There is growing burden of coronary risk factors owing to rapid urbanization and changes in lifestyle including diabetes mellitus (DM), hypertension (HTN), dyslipidemia, smoking, alcohol consumption, dietary patterns, central obesity physical inactivity, psychological factors. Burden of this risk factors in India is being reviewed in this article. The article concludes risk factors of CHD is highly prevalent in India.

**Keywords:** Coronary heart disease, India, risk factor

## INTRODUCTION

Coronary heart disease is most common manifestation of cardiovascular diseases(CVD). Coronary heart disease (CHD) manifested by fatal or nonfatal myocardial infarction (MI), angina pectoris, and/or heart failure (HF). CHD represent approximately 50 % of total first CVD events. Globally, Coronary heart disease (CHD) is a major cause of mortality and morbidity. As per World Health Organization (WHO) report of 2012, cardiovascular disease (CVD) caused 17.5 million (46.2% of NCD deaths) of the 58 million deaths that occurred worldwide.<sup>[1]</sup>PURE study has confirmed the increasing trend of CHD in middle and low income countries related to major cardiovascular event and case fatality rate.<sup>[2]</sup>

India is undergoing dramatic epidemiologic transition whereby burden of communicable diseases has been declining slowly, whereas that of non-communicable diseases (NCD) has been rising rapidly, thus leading to a dual burden. There has shown a fourfold rise in CHD

prevalence during the past 40 years.<sup>[3]</sup>The number of cases of coronary heart disease was estimated to be nearly 3.6 crore for the year 2005, which is expected to reach a figure of nearly 6.1 crore cases in the year 2015. This pattern is nearly same across all adult age groups.<sup>[4]</sup>The prevalence of IHD in 1960 in urban India was 2%, and increased 7-fold to ≈14% by 2013. Similarly, it more than quadrupled in rural areas, from 1.7% to 7.4% between 1970 and 2013.<sup>[5]</sup> However this can be the underestimation due to insensitive tool used or higher case fatality following acute coronary syndrome.

According to global burden of diseases 2016 nearly in India 28.09 % of total deaths are attributed to CVD [6] of which coronary heart disease itself constitute 17.8 % of total death i.e around 61 % of total CVD deaths. Age specific mortality rate [50-69 years) CHD constitute 22 % of total death. CHD which was third most common cause of premature death in 2005 now shifted to most common cause in 2016. The Global Burden of Diseases Study reported that the disability-adjusted life years lost by CHD in India during 1990 was 19 million, 30 million in 2006 and crossed 40 million in 2016.<sup>[6]</sup>

The growing burden of CHD in India can be explained by the alarming rise in the prevalence of coronary risk factors owing to rapid urbanization and changes in lifestyle. They include diabetes mellitus (DM), hypertension (HTN), dyslipidemia, smoking, alcohol consumption, dietary patterns, central obesity physical inactivity, psychological factors.<sup>[3]</sup>

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## METHODOLOGY

All the literature data bases like pubmed, embase, google scholar, Journal seek, INDMed, Cochrane were extensively searched with articles published preferably after year 2005 with key search terminologies like “Cardiovascular\* OR Coronary Heart disease OR Atherosclerosis OR Ischemic heart disease OR Myocardial\* OR Heat Attack OR “angina”, “heart”. For prevalence key term added was “Prevalence Or Magnitude OR Epidemiology” restricted to Indian study last 10 years.

### Burden of risk factor in India:

**Tobacco:** National-level data for most risk factors (with the exception of tobacco) are not available. Tobacco smoking is among the largest preventable causes of premature deaths globally.<sup>[7]</sup> India second only to China in number of smokers but seems to decrease in age group of 15- 69 years from 27% in 1998 to 24% in 2010<sup>[8]</sup> and further by 6 % point in 2016 as per GATS 2.<sup>[9]</sup> The absolute numbers of men smoking any type of tobacco at ages 15–69 years rose by about 29 million or 36% in relative terms from 79 million in 1998 to 108 million in 2015. However, Gats 2 survey shows that it has now reduced by 81 lakhs. Highest number of smokers were in Delhi (220%), Punjab (120% with lowest in Goa.<sup>[8]</sup> The mortality burden attributed to smoking is large as it is estimated to caused nearly 1 million death annually.<sup>[10]</sup> There has been decrease in prevalence of women who used tobacco to 6.8 % from 10.8 % (2005), in men to 44.5 from 57 % (2005).<sup>[11]</sup>

**Diet:** WHO panel on diet, nutrition, and prevention of chronic diseases recommend not less than five servings or 400 g of fruits and/or vegetables daily. NFHS 3 data shows that all that population consumed zero or only one serving of fruit in a week. Sixty percent of women do not consume fruits even once a week.<sup>[12]</sup> Lower socioeconomic class consumes even less due to high cost of fruits and vegetables. Data from 52 countries analyzed in 2008 shows that prevalence of low intake in India was 74 %.<sup>[13]</sup> Indian Migration study in Karnataka, Andhra Pradesh, Maharashtra and Uttar Pradesh year 2005-2007 also shown less consumption of fruits and vegetables in all types of diet (< 170 g/capita/day).<sup>[14]</sup> Other recent studies on avg. consumption of F AND V amongst urban residents of Chennai and Jaipur reported as 265 gm/day and less than 3 servings by 72.6% respondents respectively.<sup>[15,16]</sup>

33 percent of women and 24 percent of men are vegetarians<sup>[12,17]</sup>

All dietary patterns exceeded the recommended Na intake level and the intake of saturated fat was greater than recommended for 20 % of consumers of the ‘Rice & fruit’ pattern<sup>[14]</sup>. Similar finding was reported by Gupta et al.<sup>[13]</sup>

**Physical Activity:** Indian Council of Medical Research- India Diabetes (ICMR- INDIAB)<sup>[18]</sup> studied a representative sample of three states and one union territory of India covering a population of about 213 million, largest study of on physical activity in India shows large percentage of people in India were inactive (54.5 %) with fewer than 10% engaging in recreational physical activity. The physical inactivity is more in urban than rural area, for women and for individual with higher SES. 392 million are inactive and at risk of Non communicable diseases. Another study in Jaipur Urban shows 40 % to be physically inactive.<sup>[16]</sup>

**Obesity:** NFHS 3 also highlighted that 13% of women and 9% of men are overweight/obese in country with at least 20% of women being overweight/obese in Punjab, Delhi, Goa, Kerala and Tamil Nadu.<sup>[12]</sup> NFHS 4 shows increase in prevalence of overweight or obesity to 19 %.<sup>[11]</sup> Jaipur Heart watch study documented overweight/obesity 46.2 % and 50.7 %, high waist size 12.9% and 26.6 % high waist: hip 31.9% and 53.9 % in men and women respectively.<sup>[16]</sup>

**Diabetes Mellitus:** There were 69.1 million cases of diabetes in India in 2015 with prevalence of 8.7 %.<sup>[19]</sup> as per NFHS 4 10.75 % of adults had blood sugar level above 140mg/dl. However, this can be underestimation as random blood sample was collected not considering the history of medications. The overall prevalence of diabetes in all 15 states of India as per was ICMR-IndiaB study 7.3% [95% CI 7.0–7.5). The prevalence of diabetes varied from 4.3% in Bihar to 10.0% in Punjab and was higher in urban areas than in rural areas. The prevalence of prediabetes was 10.3 %. Except in Chandigarh, the prevalence of prediabetes was higher in urban areas in all age groups. The estimates of prediabetes is exceeding those of diabetes in most states and implying the existence of a huge number of individuals who could conceivably develop type 2 diabetes in the near future.<sup>[20]</sup> a study done in Jaipur urbans reported diabetes in 15.5 and 10.8 % males and females while metabolic syndrome in 24 %.<sup>[16]</sup>

**Hypertension:** In urban areas, the highest prevalence of hypertension (overall) was observed in Chandigarh (32.6%) and Tamil Nadu (32.3%) followed by 30.5% in both Jharkhand and Maharashtra. In rural areas, Tamil Nadu had the highest prevalence of hypertension (28%) followed by Maharashtra (24.5%), Jharkhand (22.2%) and Chandigarh (20.4%). [21]NFHS 4 shows prevalence of 11.2 % only may be due to fact of not considering the person already on antihypertensive medication. <sup>[11]</sup>

**Dyslipidemia:** The prevalence of dyslipidemia ranged from 75.7% in urban Maharashtra to 87.2% in urban Chandigarh and 76.5% in rural Tamil Nadu to 81.1% in rural Chandigarh. [21] Study done in Jaipur reported Age adjusted prevalence (%) in men and women for high total cholesterol > or = 200 mg/ dl 148 (33.0) and 93 (32.7), low HDL cholesterol < 40/50 mg/dl 113 (25.1) and 157 (55.3) respectively. <sup>[14]</sup>

**Psychological Stress:** well-planned trail is still to come to determine the true cause–effect relationship and whether intervention reduces the cardiovascular risk. <sup>[22]</sup>

## CONCLUSION

There is declining trend on smoking and tobacco in India. Obesity, Diabetes, hypertension and dyslipidemia is alarmingly on rising trend. Diet of Indians exceed in sodium intake and saturated fat. Fewer studies on physical activity in some part of India on specific population cannot be generalized. No well-planned trail done on cause effect relationship of psychological stress and CHD.

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# Horizontal Ridge Augmentation Using Ridge Expansion Technique Followed by Implant Placement

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## ABSTRACT

The method of horizontal bone augmentation using ridge split and expansion was introduced by Dr. Hilt Tatum about 30 years ago, and it has been followed since then. Though there are many methods available for horizontal bone augmentation, ridge split and expansion has been used widely. In this case report we describe a case of horizontal ridge augmentation using ridge expansion along with simultaneous implant placement in esthetic maxillary anterior region.

**Keywords:** Ridge split, ridge augmentation, deficient bone, ridge expansion

## INTRODUCTION

Rehabilitation of partially or completely missing teeth using dental implants has become the most demanding treatment option with patients<sup>1</sup>. Adequate amount of bone is necessary for successful osseointegration of dental implants and many techniques have evolved so far to improve the quality and quantity of the bone<sup>2</sup>.

Ridge augmentation procedure not only improves the bone quality and quantity but also the *orthoalveolar* form – which includes the alveolar bone form and the gingival esthetic outcome<sup>3</sup>. It has been documented that after the extraction or exfoliation of natural tooth, there is a rapid reduction in the labial cortical bone volume of about 25% in the first year followed by a reduction

of bucco-palatal width by 40-60% in the next 3 years<sup>4</sup>. Management of such cases becomes even more critical in esthetic region, and calls for special procedures to accept implant retained prosthesis.<sup>5,6</sup>

Ridge augmentation which has been in use for past 20years<sup>7</sup> can be either horizontal or vertical augmentation and can be achieved using different techniques using block bone grafts, distraction osteogenesis and either alveolar bone splitting or expansion or combination of both. *The classic and commonly used technique includes splitting the alveolar ridge into 2 parts with use of ostetomes and chisels, modification of this technique includes the use of rotating instrument, screw spreaders, horizontal spreaders and ultrasonic device.*<sup>8</sup>

Ridge splitting or ridge expansion technique was first introduced by Dr. Hilt Tatum in the year 1970 and can be used in narrow edentulous ridges for both maxilla and mandible provided the width of the bone is more than 3mm and less than 5mm<sup>9</sup>. Proper case selection and diagnosis is important for the success of this technique. In this case report we present horizontal ridge augmentation using ridge expansion procedure in the maxillary anterior esthetic region followed by implant placement and subsequent restoration using PFM bridge.

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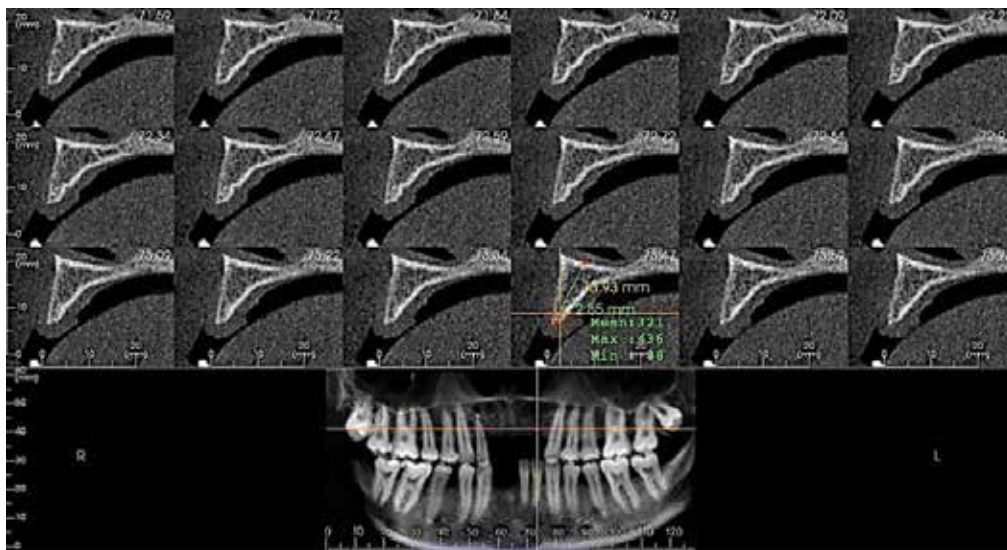
**Fig. 1: Intra-oral examination**



**Fig. 2: Intra-oral examination**

**Case report:** A 20 year old male patient reported to the Department of Implantology, Manipal College of Dental Sciences, Manipal with a chief complaint of unaesthetic appearance due to his missing upper and lower front teeth for past 1 year after a trauma. The patient was using a removable prosthesis and was unhappy with the same.

Intraoral examination revealed missing 11, 21, 22 and 41, 42 with thick gingival biotype and reduced labio-palatal alveolar crestal bone width w.r.t 11, 21 and 22 (Figure 1, 2). Hence, it was classified as Siberts Class I ridge deficiency. The patient was moderately built with no relevant medical history.



**Fig. 3: Pre-op CBCT evaluation**

**Radiographic evaluation:** CBCT examination revealed D4 bone quality with adequate bone height and a width of 2.85 mm in the maxillary anterior alveolar crestal region which increased in diameter apically (Figure 3).

**Treatment plan:** The patient was given the options of implant supported fixed prosthesis and conventional fixed dental prosthesis. The patient opted for implant supported prosthesis w.r.t 11, 21 and 22 and conventional fixed dental prosthesis w.r.t 41 and 42.

Hence, it was decided to go ahead with horizontal ridge augmentation using ridge expansion technique w.r.t 11, 21 and 22 followed by cement retained PFM

implant supported prosthesis and conventional PFM fixed dental prosthesis w.r.t 41 and 42.



**Fig. 4: Full thickness flap raised**

**Surgical technique:** The site was anesthetized using 2% lignocaine containing 1:1, 00,000 adrenaline. A sharp incision palatal to mid-crestal was made and full thickness flap was raised to expose the ridge crest (Figure 4). The labio-palatal width as already evaluated in CBCT was 2.85mm and the width increased apically, hence it was decided to reduce about 1mm of bone to attain a minimum labio-palatal width of 3mm.

All the drilling procedures were carried out using Nobel Biocare™ Replace Select Implant Drill Kit and the ridge expansion was performed using Nobel Biocare™ Osteotomy kit.

The exact location of implant was marked using the pilot drill and it was placed 0.5 mm palatal to the mid-crestal region. This gave us good amount of labial bone thickness that will prevent fracture of the labial cortex during ridge splitting.

The initial 2mm drill was used to prepare the osteotomy site approximately 2mm deeper than the final implant length of 11.5mm followed by insertion of successive larger diameter osteotomes of 0.5 mm till the final implant diameter of 3.5mm was obtained. Simultaneously, the length of the osteotome was reduced sequentially than the preceding instrument, so as to expand the base of the bone in V shape.



**Fig. 5: Implants in place**



**Fig. 6: Nova Bone putty being placed in space between the implants**

Two Nobel Biocare™ Replace Select implants of 3.5 X 11.5mm were threaded in to the osteotomy site (Figure 5) and coverscrews were placed, following which the space between the implants were filled with NovaBone® putty (Figure 6). Periosteal releasing incision was made to extend the flap coronally over the implant so as to achieve tension free close approximation of the flap using interrupted suture (ETHICON™ Nylon Suture). Analgesics and antibiotics along with Chlorhexidine mouthwash 0.2% was prescribed to the patient and postoperative instructions were given.



**Fig. 7: Prosthetic rehabilitation after 7 months**



**Fig. 8: Post-op OPG**

Sutures were removed after 7 days and patient was periodically reviewed for next 7 months followed by prosthetic rehabilitation with PFM bridge (Figure 7, 8).

## DISCUSSION

Management of horizontally deficient ridge can be carried out using narrow diameter implants, ridge augmentation by block bone grafts, distraction osteogenesis etc. Use of narrow diameter implants can create unwanted cantilever effect resulting in fatigue fracture of either the abutment screw or the implant itself. Ridge augmentation using autogenous block bone grafts has its own disadvantages of long waiting period, risk of infection and membrane exposure. Distraction osteogenesis is a cumbersome procedure leaving the patient uncomfortable.

Ridge splitting and expansion of thin alveolar ridges to gain missing ridge width as a method of bone

augmentation procedure has been reported for the partially and fully edentulous maxilla and mandible in implant dentistry for almost 30 years. In 1994 Scipioni et al<sup>4</sup> carried out a study on 170 patients by placing 329 implants using ridge split and expansion technique. The authors reported a success rate of 88.5%. Though it is technique sensitive, the main advantage of this procedure is that it helps in condensing the bone towards the walls rather than removing the bone, thereby improving the quality of the bone.

The most common thickness chosen for ridge expansion technique is around 3–5mm. If the thickness of bone is less than 3mm, the medullary bone present between the buccal and the palatal cortical plates will be 1mm or less<sup>10</sup>. It becomes an obvious surgical challenge to separate such cortical plates successfully without fracture because more the medullary bone present, more easily the cortical plates can be separated<sup>3</sup>. Also, the topography of an extraction site is that of an iceberg, which means the diameter increases apically. Hence, it was decided to reduce around 1mm of bone from the crestal surface to increase the width of the labio-palatal ridge from 2.85 mm to 3mm or more.

The osteotomy site preparation was done palatally to the mid-crestal region, so as to provide adequate amount of labial cortical bone for expansion and prevent its fracture. Also, the osteotomes used were increased in their diameter sequentially with a rest of 15 seconds between each tap and rotating them gently and pulling it out axially thereby using the visco-elastic nature of the bone and hence maintaining its resiliency<sup>11</sup>.

As the osteotomes used were successively increased in their diameter by 0.5mm they were also reduced in their length, which resulted in a V shaped osteotomy site rather than a U shaped osteotomy site. This gives less probability for fracture of labial cortical plate.

The implants were threaded into the osteotomy site using slow speed and in between the implants the gap was filled with NovaBone® putty which is a synthetic graft made up of Calcium Phospho-silicate bone material. This will help in bone remodeling and also reduce the crestal bone loss<sup>12</sup>.

## CONCLUSION

Though there are many methods available for horizontal ridge augmentation, the success of any

technique used depends on proper case selection and bone evaluation. Bone augmentation by means of horizontal ridge augmentation and implant placement is associated with high implant success and survival rates by 86 – 97%<sup>13, 14, 15</sup>. Hence, the ultimate goal should be a restoration which would fulfil the esthetic and the functional requirement.

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# Services of Untouchability in the Sacred Complex of Lingaraj Temple

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## ABSTRACT

The problem of untouchability is considered as a serious social malady in the Indian society and is one of the cruellest characteristics of the Indian caste system. The notion of pollution, defilement and contamination have resulted in the worst evil of Hindu society termed as untouchability. The Hindu society is mainly classified into four Varna's or classes on the basis of caste Hierarchy. The fifth class is the untouchables which is placed outside the caste hierarchy by the people of other castes. In Lingaraj temple there are 36 categories of *sewayats* (sacred servant) represent 36 different caste or *Nijoga* locally termed as *chhatisa Nijoga* serving in the temple as daily *sewayats* and 17 categories of sacred services performed occasionally. Out of which three categories of *sewayats* are grouped under 'Untouchable castes'. They are Dhoba (Sudra), Bauri and Hadi. This paper examines the problem of untouchability in the sacred complex of Lingaraj temple from ethnography field study.

**Keywords:** Untouchability, *Sewayats*, Lingaraj temple, *Nijoga*, Varna

## INTRODUCTION

Lingaraj temple is a temple of the Hindu God Lord Shiva and is one of the oldest temple of the temple city Bhubaneswar, India. Bhubaneswar is a revered pilgrimage center and it is capital city of Odisha. As an important religious center, the temple town was famous as Ekamrakshetra.

Untouchable implies impurity or pollution. They are considered as outside the group of caste Hindus and considered as out castes. Untouchability is one of the cruellest characteristics of the Indian caste system. It is observed as one of the hardest racist phenomenon in the world.

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The problem of untouchability is a serious social malady in the Indian society. The notion of pollution, defilement and contamination has resulted in the worst evil of Hindu society termed as untouchability. The untouchables were called by different names in different periods. In the Vedic period, the untouchability was known as *chandala*. In Medieval times, they were known as *Achhuta*. In British period they were known as Exterior caste or Depressed caste. In the recent times, they are known as the Schedule caste, the name given by the Indian constitution for their upliftment<sup>1</sup>. Untouchables are those who are suffering from certain disabilities imposed on them by the superior castes, through the practise of untouchability. Untouchables refer to the despised and degraded section of the Hindu population. They are also called as Dalits. Mahatama Gandhi lovingly called the Untouchables as 'Harijans', the children's of God<sup>2</sup>. Dumond opined that the situation was changed somewhat after the Gandhian agitation when India got independence. Untouchability was then considered as illegal. Gandhi called untouchables as Harijans or Sons of Hari (Vishnu)<sup>3</sup>.



The Hindu society is mainly classified into four Varna's or classes on the basis of caste Hierarchy as shown in Figure 1: Brahmins (Priests, scholars and teachers), Kshetriyas (Rulers, warriors and administrators), Vaisyas (Merchants, agriculturist, artisans and cattle herders), Sudras (labourers and servant class) and the fifth class, placed outside the caste hierarchy, is the untouchables. This caste group performs menial work like cleaning the dirt and filth of the society. In large part, they work as toilet cleaners, sweepers and cremators of the dead bodies of human and animals. Due to their employment which deals with excrement, this class is not included in the social hierarchy and considered as the outcastes or the untouchables<sup>4 and 5</sup>. Historically sudras had been subjected to extreme forms of exploitation, degradation and inhuman treatment by the upper section of society. The practice of untouchability appeared to be the creation of the Dwijas so as to keep them in misery and poverty and to give them a slavish treatment.



**Figure 1: The Hindu Caste Hierarchy**

In Indian society, the people employed in polluting and dirty occupations are grouped as polluting people. They are therefore regarded as untouchables. They have almost no right in the society. In distinct parts of our country the untouchables are treated by different ways. In most of the parts, the attitudes towards the untouchables are very strict and harsh. In few areas it is less strict. The areas where the attitudes is less strict the untouchables were considered as polluting people and their homes are arranged at a distance from the settlements of the four Varna communities. The

untouchables are not allowed to touch people from the four Varna. They are not allowed to enter houses of the higher Varna, temples, prohibited to walk in caste Hindu Street and drawing water from the same wells use by the Varna's. In public functions they were obligated to sit at a distance from the four Varna's. In areas where the attitude towards the untouchables were very strict, not only touching them was seen polluting, but even a contact with their shadow was seen as polluting. If there was a close interaction between an untouchable and a member of the Varna's, the Varna member turned defiled and had to immerse or wash himself with water to be purified. In strict societies, especially among the 'Twice born' (the four Varna's) the untouched 'twice born' also had to pass through some religious ceremonies to purify himself from the pollution. If an untouchable entered a house and touched things of a Varna member, the Varna members wash or clean the place where the untouchable touched and stepped in.

As Government has taken many steps for the eradication of untouchability, still in the minds of some higher caste people, untouchability still prevails. They still look the untouchable caste with a different eye. The traditional division of Hindus into castes, though basically still intact, has lost much of its social rigidity due to the impact of Western education and Industrialization. In the famous Lingaraj temple, the tradition is still followed. A long standing religious convention does not allow the entry of schedule castes and Non-Hindus into Lingaraj Temple. These devotees take darshan of Lord Lingaraj by standing on a raised platform situated near the northern gate<sup>6</sup>.

As an important religious centre, the temple town was famous as Ekamrakshetra. Legends trace the sanctity of the place, when there was a single mango tree with Shivalinga below it. The religious center initially develop around it and with the construction of the famous Lingaraj temple in the 11<sup>th</sup> century, the Ekamrakshetra rose into splendour and was treated as a major religious center of Shaivism. Bhubaneswar continues as a living center of pilgrimage despite changes over the centuries<sup>7</sup>.

The priests of Lingaraj temple believe that Lord Lingaraj is a combination of both Vishnu and Shiva. In other words Lord Lingaraj is a *Harihara murti* and not *Hara* alone. A natural line that exists in the Svayambhu Lingam (self-established Linga) is pointed out by them as the line delimiting the Shiva and Vishnu components

of the same deity which is raised as *Harihara*. The leaves of tulasi and vilva, which are favourites of Vishnu and Shiva respectively are used in everyday worship. The *Brushava* or *vrissastambha* bears at the top not only of a *Brushava* (bull), the mount of Shiva, but also a *Garuda* (eagle), the mount of Vishnu, which having been placed side by side in front of the temple. This has evidently been meant to make the synthesis of the two cults visual to a visitor at his first approach to the shrine. The crowning of the great Lingaraj temple can be seen from a distance. The top most two of them are an *ayudha* (weapon) and a *pataka* (flag). In order to convey the general public that the shrine belongs to both the sects, the *ayudha* which must have originally been a *trisula*, was replaced by one consisting of half a disc and a trident. It was said that this change was brought about by a daring man who climbed to the top of the spire on the dead of night under the orders of a Ganga king (in a bet), pulled down the original *ayudha* and replaced it by this new and composite device. This daring man is said to have granted rent-free lands and given the title *Nishanka-malla* (the fearless hero) which is still borne by his descendants living in the Nuapalli village in Bhubaneswar. Some orthodox shaivas explain the disc as the *Pinaka*, the bow of Shiva, but his explanation is untenable in view of the fact that the *pinaka* or bow is never used as crowning member in any Shiva temple<sup>8</sup>.

In Lingaraj temple, the tradition is still followed among the *sewayats*. There are 36 categories of *sewayats* (sacred servant) represent 36 different caste or *Nijoga* locally termed as *chhatisa Nijoga* serving in the temple as daily *sewayats*<sup>9</sup>. Of these 36 categories, 19 sacred services are performed by Brahmans and the rest 17 sacred services by Non-Brahmans who are said to be men belonging to various castes within the Sudra order. Besides 36 categories of daily sacred services, there are 17 categories of sacred services which are performed occasionally. Out of which 5 services are performed by Brahmans and 12 services by Non-Brahmins. From the above categories, three categories of *sewayats* are grouped under Untouchable castes. They are Dhoba (sudras), Bauri and Hadi. Dhoba is the daily *sewayat* of the temple, the Bauri and Hadi are the occasional *sewayats*.

**Untouchable *sewayats* of Lingaraj Temple:** The Dhoba (washer man) is the daily *sewayat* of the temple who washes the used cloths of Lord Lingaraj and Goddess Parvati. The Dhoba *sewayat* is considered as schedule

caste or a Sudra for which he is not allowed to enter into the main temple (sanctum) but can enter inside the temple premises. Every day the Dhoba *sevak* collects the cloths by standing near the steps of *Dakhini Ghar* (southern chamber) or near *Beherana mandapa* where Paliya Badu has kept, after changing the deities dress. He then goes to Parvati temple and collect cloths from Parvati *sevak* by standing near the Parvati temple steps. Then he takes all the used cloths and washes it in *Devi-Pada-Hara* tank situated on the north-east corner outside Lingaraj temple in plain water without using detergents. After washing the cloths he handover Lord Lingaraj cloths to Changada *sevak* or Mekapa *sevak* and he dries it on the *Ba-a-khia mandapa* in the hot sun. Similarly, he handover Goddess Parvati's dress to Parvati *sevak* and he dry it in hot sun. It is said that the Dhoba *sewayat* has the right to only wash deity's cloths but has no right to dry the cloths in hot sun as the cloths will become impure, as he is considered as a Sudra *sevak*. But now sometimes Dhoba *sevak* dries the cloths and Mekapa *sevak* collect the cloths directly from *Ba-a-khai mandapa* and fold it and keep it in the *Bhandara Ghar* (store-room). Similarly Parvati *sevak* collect Goddess Parvati's cloth.

Second category of untouchable *sewayat* is *Bauri*<sup>10</sup>. Their sacred traditional service is to cut the first log for deity's Car on *Sripanchami* festival, basically *Sripanchami* rituals are performed in *Sripanchami* ground and another day they go to jungle if required and bring logs and give it in the sum mill for shaping. Sometimes the Badhei (Carpenters) select wood in the sum mill and Bauri bring the woods from sum mill loading in a tempo. They help the carpenters in making the chariot. From the next day of *Dolapurnima* festival, the construction of Car (chariot) starts and extents till 21 days. On all these days they provide woods to Badhei (carpenters). Bauri also act as a brakes man (*Kharadawala*) of deity's Car. When the car wants to stop, Bauri put *Kharada* (break) under the wheel and also helps in turning the wheel in the curve. With the help of *Theka* (hammer) they release the brake (*Kharada*) under the wheel. When the chariot moves they put oil and water on the wheels for smooth moving. They construct and decorate the *Dolabedi* (Mandapa) for *Dolapurnima* festival and also provide wood to carpenters for making barge for *Chandan yatra* festival. Previously the *Bauri* used to sweep the road along which the Car is drawn during the Car Festival. When the Car is drawn, the Bauri and Hadi also make the road ready for the purpose. They



built temporary embankments on both side of the road ready, so that water does not flow over it. If the wheels get struck in mud, they scrape away mud in order to release the wheels, while pilgrims pull the rope in order to make the Car move. But now these services are not done by Bauri and Hadi as the road became metalled and the Bhubaneswar Municipality Corporation (BMC) has taken up the work of cleaning the road. As they belong to untouchable caste, the Bauri's were not allowed to enter the temple premises. They stand outside the temple near the *Simhadwara* and take the *darshan* of Lord Lingaraj and wholeheartedly participate in all the festivals performed outside.

The third category of sacred servant is Hadi (sweeper). They are also untouchable caste and were not allowed into the temple premises which are surrounded by high walls pierced by four gates. The main duty of the Hadi *sevak* is to play drums (*Madala*) when deities go out in festivals and used to accompany the procession (*yatra*). They cleans the road owned by the temple. Now the *Hadi* service is discontinued as he was not provided with satisfactory remuneration, with time his health condition deteriorated and suffered from paralytic attack.

The untouchable castes were not allowed to enter into temple on normal days. They are allowed to enter into temple (sanctum) only on the day after Shivaratri festival and take *darshan* of Lord Lingaraj from morning till afternoon. In the early morning the untouchable *sewayats* goes to the temple and clean the temple premises which had become dirty by throwing of flowers, earthen lamps, and leaves etc. by devotees on Shivaratri festival. One of the informant revealed that the untouchable *sewayats* used to enter the temple premises through the Northern gate instead of Eastern gate and clean the temple premises in the morning. After cleaning the temple they return to their house and after becoming fresh they return back to the temple to take deity's *darshan*. By making half *pradikshana* (circumambulation) in the temple premises, enter into the sanctum through *Dakhini Dwar* (southern chamber) and take *darshan* of Lord Lingaraj and performs worship by standing in the *Jagamohana* (audience hall). Some of the untouchable sacred servants revealed that previously they were not allowed to enter *Jagamohana* (audience hall). After entering from the Northern gate they straight away enter into *Natamandira* (dancing hall), take *darshan* of Lord Lingaraj from a distance and come out. But they are not allowed to

enter into the *Deul* called as *Gharba Griha* (sanctum sanatorium) and *Bhogamandapa* (food offering hall). On this special day only the untouchable caste are allowed to take *darshan* of Lord Lingaraj from morning 7am to 2pm afternoon. After that they are not allowed inside the temple. After their *darshans* the temple is cleaned and holy water (*chunapani*) is sprinkled all around inside and outside temple premises as a mark of purification ceremony. Deities are then given *Mahasnan* (Great bath) with *panchaamruta* (five nectars like milk, curd, honey, molasses, and ghee) and as usual the daily rituals begin in the temple.

Among the untouchable *sewayats*, it was found that they did not give much importance to higher education. Before completing the school education they adopted different services. The *Bauri sewayats* are occasional *sewayats* (sacred servants) of temple. They are mainly engaged as daily wage earners like mason, newspaper suppliers, rickshaw pullers, trolley pullers etc. As they are still educationally backward, few sacred servants have adopted other services and left the sacred services. There were 12 Bauri *sewayats* serving in the temple but now only 8 *sewayats* are serving the deity. For doing sacred duty they receive remuneration on daily wage from temple authority. Though the Dhoba *sewayats* are daily *sewayat*, with the change of time the Dhoba *sewayat* have left their traditional caste based occupation and have adopted new services. Besides the sacred service, to maintain their livelihood he has a cycle repair shop in the town. Only one Dhoba family is serving the deity daily. Similarly there was one Hadi *sewayat* and he discontinued the sacred service due to his old age and his sons did not continue due to low remuneration received from temple. They are working in BMC as sweeper and the old Hadi *sewayat's* wife is working in Municipality Hospital as sweeper.

With the change in the traditional occupation and life style, the traditional family life has been affected. The joint family system which was prevalent in most societies is slowly converting into nuclear family mainly due to poor income, family problems etc. Table 1 shows the family type of sacred servants. Families of the untouchable functionaries provides full external support to men in temple services as they cannot help them in doing sacred service and plays an important role in family solidarity, economic cooperation, maintenance and taking care of children.

Among the untouchable functionaries, father is the leader of the family, who controls the family economy of subsistence for his family members and mother commands the inner household affairs very actively than the male counterpart. Thus the untouchable *sewayats* family is considered as a patrilineal, patrilocal and patriarchal family.

**Table 1: Family Type of sacred servants**

Family Type	Family serving the deity		Family not serving deity	
	No. of Family	Total Family Members	No. of Family	Total Family Members
Nuclear Family	2	8	3	14
Joint Family	6	54	3	19
Extended Family	-	-	-	-
Broken Family	-	-	-	-
Incomplete Family	1	5	2	7
Total	9	67	8	40

The traditionality in dress, ornaments, food habits and social relationship is a special feature of their social life. The women wear sarees which is a traditional dress of our Indian culture and covers their head with the *pallu* (chuni) of their sarees if elders (in-laws) are living with them which shows a sign of respect towards their elders. Even the daughter-in-law does not utter her parent-in-laws name. If someone asks them their parent-in-laws name they take help of their neighbours, relatives or speak with a sign language. The married women do not wear any other garments except sarees. They wear *sindoor* on their forehead, red bangles, rings in the finger and toes which are a pure traditional approach of an Odia Hindu married women.

Besides this, modernity have influenced among the *sewayats* families like eating habit, dress sense, life style, customs, culture etc. The young boys and girls have adopted modern dress with the influence of city life. The boys have adopted pants and shirts instead of *Dhoti-kurta* and girls have adopted modern dress like salwar-kamiz, frocks etc. The woman plays an important role in functioning of the house. They look after the elders, children and were mainly confined to home but with the change of life style they started working as servants to upgrade the family income. The women and girls of *sewayats* family cannot participate in the temple service in helping the male members. The sacred service is hereditary and passes from father to sons. If the father is not able to perform his *pali* (sacred service) for some reason his son helps in performing the sacred duty, nor he can arrange a proxy from his groups who helps him in doing his sacred duty. The food habits of sacred specialists (*sewayats*) are divided into two broad categories- vegetarian and non-vegetarian groups. The

untouchable *sewayats* are basically non-vegetarians. They used to take both vegetarian and non-vegetarian type of food with typical Odia food flavour. Their main staple food is rice.

Man is a social animal. He does not live alone in the society. He is confined on all sides by a number of people from birth to death. It might be his relatives, friends, neighbours and others who are strangers to him. He is bound to all those people who are related to him either on the basis of blood or marriage. The blood or marriage based relationship may be close or distant. The connection based on blood or marriage binds man together in-group is called kinship.

Among the major kinship group, family plays an important role. As the family contributes to the economic, social and biological aspects of members they have been divided into nuclear, joint and extended families. It is seen that especially among the *sewayats* group joint family system is more found than nuclear and extended family.

After the establishment of new township in the state capital several secular avenues were opened which diverted the attention of the young, educated and able-bodied *sewayats*. There are many *sewayats* who have left the sacred service and adopted other secular services. There are several reasons responsible for the economic shift:

- (i) Higher education among the young *sewayats* does not allow them to adopt the temple service for low remuneration.
- (ii) Compared to the present cost of living they receive low remuneration in temple service.

- (iii) The Dhoba, Bauri and Hadi *sewayats* receives less prestige in doing their traditional sacred service compared to the higher caste *sewayats*.

Among the *sewayats* of Lingaraj temple various kinds of kinship behaviour are found like respect, love, affection, avoidance, joking, tekonomy etc. The behaviour of a son toward his father is respect. The behaviour of a husband toward his wife is love. The behaviour of a brother toward his sister is affection. If two kins remain away from each other then it is considered as the avoidance relation. They should not only keep away from sexual relationship, but in some cases they avoid seeing the faces of each other. Among the *sewayats* families avoidance relationship is seen among the father-in-law and daughter-in-law. The daughter-in-law does not utter their father-in-law, mother-in-law's name and only wears traditional dress (saree). She covers her head with the *pallu (chuni)* of the saree as a mark of respect.

The Joking relation is the reverse of Avoidance relationship. The kin members are allowed to tease or make fun of the other. The relationship which is existed among the *devar-bhabi*, *jija-sali* are based on joking relationship. The joking may amount to fun making, exchange of abuses etc.

Teknonymy is another form of kinship behaviour prevalent in the society. In this relation the kin is not referred directly by his/her name but he/she is referred through another name. Among the *sewayats* family the wife does not utter their husband by name. She refers through her sons or daughters name like Guddus father etc. Same way the husband also refers her by their sons or daughters name like Guddus mother etc.

The bonding of relationship among the untouchable *sewayats* is so tight that if any problem occurs all the *sewayats* come together and provides solution. It is also seen that all the blood relatives does not live nearby each other's houses or in same *sahi/ward* because to avoid restrictions of pollution or impurity during death, birth etc.

As the untouchable *sewayats* cannot enter any temple and perform offering, all the families of *sewayats* give importance to *Gramadevata*. The *Gramadevata* of Bauri, Dhoba and Hadi *sewayats* is Maa Dhula Dei (Goddess Mangala). They have their own caste priests called *Purohit* and *Behera* who perform worship in the temple. During the marriage ceremony the *Purohit* and

*Behera* plays an important role. The *Behera* arranges all the puja items on the *bedi* (Mandap), he used to serve the guest with chandan, flower etc., brings the girl to the *bedi* for marriage ceremony. The *Purohita* performs Homa by chanting mantra. Same way the *Purohit* and *Behera* are invited to perform the *shradha* on the 11<sup>th</sup> day of death ceremony. The *Behera* arranges all the puja items and *Purohita* performs the Homa. Even after one year of death ceremony Homa is perform by them in the concern home. The *Purohita* and *Behera* of untouchable *sewayats* are Lakshmidhar Dash and Bata Krushna *Behera* respectively.

## CONCLUSION

The problem of caste system in Indian society could not be eliminated but has somewhat reduced. There still exists a feeling of superiority of caste. Generally, the higher caste sacred servants (*sewayats*) that is non-Harijans of Lingaraj temple have their own area of concentration while the Harijans like Bhoi/Bauri, Hadi and Dhoba live in separate blocks or segregated settlement without mixing with higher caste groups. Even the untouchable *sewayats* are not allowed to enter inside the temple premises. They stand outside the temple near the *Simhadwara* and take the *darshan* (blessings) of Lord Lingaraj. It is seen that still in this modernized world, in the mind of some higher castes people the belief of untouchability still exists. They still hesitate to enter the Harijans *sahi* (wards). We experience the practice of untouchability in everyday life around us, especially in rural and semi-urban areas of our country. Even in metropolitan cities, the inhuman practices of manual scavenging still exist. However, it could be said that things are slowly changing. The mind set of our modern generation is also changing. The relationship between the *Badhei sewayats* (carpenters) a higher caste sacred servant and Bauri a harijan caste are closely related. While making the deities chariot they work hand in hand without looking the caste differences. The Bauri's also participate wholeheartedly in constructing deities chariot (*Ratha*) and all other festivals performed outside the temple. One of the higher caste sacred servant revealed that according to temple rules untouchables are not permitted entry inside the temple but he says in this era it is not possible to identify a person's caste from his or her face. Now the restriction only is applied to the temple sacred servants and nearby resident. Today, the people with modern education and globalised outlook

are looking at the society from different view. They view the social order of the society with equality, impartially and not from the religious or traditional point of view. Hope, the morally bad practice of untouchability would be removed from the society sooner. Our country would enter into a new era of social equality and brotherhood.

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# Harnessing the Differentiated Model of HIV-AIDS Care as an Enabling Factor for Successful HIV-AIDS Programme Management

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## ABSTRACT

UNAIDS estimates that 37million individuals are infected with HIV-AIDS<sup>6</sup>. Traditional modes of service delivery cannot meet the needs of those infected and affected by HIV-AIDS. This has led to the development of several service delivery care models of care. One such model is Differentiated care. “Differentiated care is a responsive, client-centred approach that simplifies and adapts HIV services across the cascade to better serve individual needs and reduce unnecessary burdens on the health system”<sup>1</sup>. This is fast growing concept that is being utilised in both the developed and developing world allowing better care, wellness and treatment to HIV-AIDS sufferers across the globe. This paper explores the use of the differentiated care model across the various multi sectoral responses to HIV-AIDS and assesses the benefits of the model as an enabling factor for successful HIV-AIDS programme management both locally and globally.

**Keywords:** *HIV-AIDS, Differentiated care*

## INTRODUCTION

Differentiated care, or differentiated service delivery, has been defined as “a client-centred approach that simplifies and adapts HIV services across the cascade, in ways that both serve the needs of PLHIV better and reduce unnecessary burdens on the health system”<sup>5</sup>. With regard to differentiated care, less stable patients require fewer services than critically ill patients therefore allowing for better resource allocation<sup>4</sup>.

Differentiated care can be applied across the continuum of care for HIV-AIDS<sup>2</sup>. The differentiated care framework includes variability in the service delivery, providers and locations. The WHO defines specific care packages based on care needs such as the type of services delivered; the location of service delivery; the provider of the services and the frequency of the services<sup>7</sup>. In order to accommodate this model several service providers, clinics and partnerships have exhibited buy in to the model to ensure its viability and success. Decentralisation of service is key to the process together with partnerships. Decentralisation allows more task shifting from larger central clinics and health facilities situated in towns and central localities to more rural smaller clinics and health facilities on the

peripheries. This in turn increases the reach of the health facilities resulting in more patients being encountered, tested for HIV-AIDS and encourages more health seeking behaviour. Partnerships with local vendors and community based pharmacies allow for decentralisation of services where patrons can fetch medications at smaller closer rural locations as opposed to travelling long distances to reach central healthcare facilities.

## METHODOLOGY

A retrospective review was done across public, private and ngo based South African HIV-AIDS management programmes. Given the relatively new concept of differentiated care it was not expected for extensive literature for implementation and operational research to be available. A review was undertaken of fall private HIV-AIDS management programmes, selected ngo HIV-AIDS management programmes and the state run national HIV-AIDS management programme.

## RESULTS

The review revealed that no HIV-AIDS management programmes in private healthcare sectors have been implementing the differentiated care model to date.

Selected ngo HIV-AIDS management programmes have embarked on implementing aspects of the differentiated care model. Some of these have been in tandem with the state run national HIV-AIDS management programme.

## CONCLUSIONS

The differentiated care model when applied to HIV-AIDS programmes will ensure an efficient and safe approach to management of HIV-AIDS patients. The key to the differentiated care model for HIV-AIDS is that careful eligibility criteria should be undertaken to the entry into the programme. This will allow for careful evaluation of patients in terms of pathology and disease progression. Since not all patients will be requiring the same level of care and effort, the strain on the healthcare workers will be minimal. This will allow for more intensive efforts on high risk patients with less intensive time and resourcing on medium and low risk. This model will also allow for a more accommodating and efficient resourcing requirements allowing healthcare workers to remain engaged to deliver their best at all times. A model correctly run on the differentiated care principles can be a sustainable model for delivery for role out across multi-sectoral HIV-AIDS programmes.

Adherence to ARVS has historically been a pivotal issue in HIV-AIDS management programmes as patients have to ensure daily medication ingestion. The differentiated care model when applied to HIV-AIDS programmes can result in more compliant and adherent cohorts thereby allowing a better clinical response in patients with optimal outcomes. This can also contribute to better quality outcomes in the programme resulting in better monitoring and evaluation outputs from the programme.

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# Can Artificial Intelligence be Used as an Enabler for Anti-Retro-Viral Medication Adherence in HIV-AIDS Management Programmes?

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## ABSTRACT

HIV-AIDS is a highly prolific disease and public health concern affecting the globe with developing countries more affected than developed countries. The mainstay of efforts to control the epidemic has been emphasised on HIV prevention, HIV treatment and HIV wellness. With established HIV-AIDS programmes and stable less toxic drug regimens, a strong focus has been enrolment onto Anti-retroviral combinations with strong adherence and medication compliance. Adherence to medication across all different types of disease entities has been difficult and ARV adherence is no different. As such, the clinical fraternity is in constant search of novel advances to enhance and optimise ARV adherence. On such approach is the use of artificial intelligence modelling as a tool for adherence enhancement. This paper reviews the available data on artificial intelligence use as an adherence enabler in HIV-AIDS programmes.

**Keywords:** *HIV-AIDS, adherence, artificial intelligence*

## INTRODUCTION

HIV-AIDS is the largest disease burden across the world with the highest prevalence being found in South Africa. UNAIDS estimates that there is an adult disease prevalence of 18, 9% with 270000 new infections occurring every year<sup>4</sup>. There are also almost 100 000 HIV related deaths annually. The mainstay of clinical management of this disease is monitoring and sustaining the use of anti-retrovirals aimed at halting disease progression in all affected individuals. To date 7.1 million people are on ARVs in South Africa. About 56% of all adults are on ARVs while 55% of all children are on ARVs<sup>1</sup>. This implies that just under half the adult and children affected populations require urgent Anti-retrovirals. On 30 September 2015, the WHO announced that: "Anyone infected with HIV should begin antiretroviral treatment as soon after diagnosis as possible, WHO announced Wednesday. With its "treat-

all" recommendation, WHO removes all limitations on eligibility for antiretroviral therapy (ART) among people living with HIV; all populations and age groups are now eligible for treatment." This new Test and Treat WHO new policy could help avert more than 21 million deaths and 28 million new infections by 2030<sup>7</sup>. This is a phenomenal move for all clinicians and healthcare workers who have worked in the field of HIV-AIDS care and who have initiated and managed patients onto ARV. The goals of any ARV programme is to ensure clinically appropriate use of ARV's, ensure adherence to the ARVs and finally to preserve first line effectiveness and prevent patient morbidity and mortality. One cannot exclude the effect that TB has on HIV and the pill burden and the combined TB-HIV epidemics. HIV is driving the TB epidemic in South Africa, with a TB/HIV co-infection rate of above 60% it is clear that the war against TB will never be won unless we win the war against HIV."<sup>5</sup> South Africa has a well define National Strategic plan (NSP) addressing the HIV epidemic. The NSP 2012–2016 is driven by a long-term vision for the country with respect to the HIV and TB epidemics. It has adapted, as a 20-year vision, the Three Zeros advocated by UNAIDS. The vision for South Africa is: „ Zero new HIV and TB infections; „ Zero new infections due to vertical

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transmission; „ Zero preventable deaths associated with HIV and TB; „ Zero discrimination associated with HIV and TB. In line with this 20-year vision, the NSP 2012-2016 has the following broad goals: „ Reduce new HIV infections by at least 50% using combination prevention approaches; „ Initiate at least 80% of eligible patients on antiretroviral treatment (ART), with 70% alive and on treatment five years after initiation; „ Reduce the number of new TB infections as well as deaths from TB by 50%; „ Ensure an enabling and accessible legal framework that protects and promotes human rights in order to support implementation of the NSP; and „ Reduce self-reported stigma related to HIV and TB by at least 50%<sup>4</sup>.

Adherence to lifelong ARVs can be a challenge and the question is how to ensure adherence is maintained and sustained throughout an HIV positive individual's life?

## **METHODOLOGY**

A retrospective review of available data on adherence of ARVs was conducted to assess enablers and barriers to ARVs resistance in ARV programmes. Selected barriers are discussed next.

## **FINDINGS**

Many patients attending ARV clinics verbalised that the high pill burden is an issue and prevented them from taking meds daily. In addition, the pills were large and difficult to swallow and could pose a problem to those patients who have selected swallowing issues or dysphagia. This resulted in patients not taking their medication. South Africa has a very large HIV epidemic and in the initial days not every Department of Health clinic provided ARVs. Selected clinics with the necessary staffing, clinical resources and medications were often the only places to get ARVs and clinical management of care. Often these were the centrally based large clinics often situated near district or provincial hospitals. Very often this meant that many clinic patrons have to travel long distances for care, this means that this also prohibited taking up of care and referrals to care. Selected ARV side effects also prevented patients from taking their pills as required however they need more Arv counselling to assess that side effects usually get better within the first 30 days of use thereby allowing a better patient experience. There are also cultural barriers to use and adherence. This can be due to patient set of

knowledge, belief and religious practises which prohi the ingestion of medications at selected times in addition to when they are fasting or abstaining from food.

Socio-economic circumstances have also a role to play as a barrier to ARV adherence. Often positive patients do not even have food or sustenance and have to take medication, these results in occurrence of more side effects. At one stage various departments of health used to offer food hampers to families in need of food often in the programmes to assist with ARV adherence but this has since changed.

As HIV positive individuals are living longer, they are also prone to develop other co-morbidities and other non-communicable diseases. This contributes to a greater disease burden with combined pill usage and contributes to multiple pills for use. TB and HIV is a common synergistic issue in South Africa which further adds to the pill burden and often the dual side effects. This is a further inhibitor to care and uptake of care with minimal referral to care resulting in poor adherence.

So the question then is: what are the enablers for enhancing ARV adherence and how can this be utilised in real life settings to ensure maximum patient benefit?

Medical futurist<sup>2</sup> believes :”that we are experiencing the Fourth Industrial Revolution, which is characterized by a range of new technologies that are fusing the physical, digital and biological worlds, impacting all disciplines, economies and industries, and even challenging ideas about what it means to be human. Healthcare will be the lead industrial area of such a revolution and one of the major catalysts for change is going to be artificial intelligence”. Artificial intelligence (AI) in healthcare uses algorithms and software to approximate human cognition in the analysis of complex medical data. The primary aim of health-related AI applications is to analyse relationships between prevention or treatment techniques and patient outcomes<sup>3</sup>

Artificial intelligence has a huge role to play in the HIV-AIDS clinical arena and in the clinical management of patients. By utilising artificial intelligence in an ARV clinic setting, one could assess all the data that has been collated over time for that specific clinic and if inputted correctly could yield very important information. The data will be able to provide clinical information on all patients but the highest risk of patients would be of most interest or value. This will create a high, medium and



low risk of patients which will require the same amount of care including high, medium and low level of care. This can also dictate the level care required by the patient with the highest clinical resource dedicated to the highest risk of patients.

AI can revolutionise the way medicine is conducted .Based on medication data and how members collect medication every month, one will be able to predict who needs be acted upon the poor adherers and non-adherers are. This will allow for a pro-active, pre-emptive action to allow for defaulters to be picked up in real time and actioned on accordingly. This will in turn provide lesser burden on the ARV clinic staff and resources.

## DISCUSSION

Adherence will continue to be an issue in ARV programmes across the globe if significant tools and processes are not instituted. While adherence to medication can occur to all types of medication, it is more possible for non-adherence to ARVS more specifically as result of this being life- long therapy. Various models of AI can be instituted to assist with planning of clinical co-ordination of staff to assign to high risk members who are defaulters and such provide timely interventions.AI is a novel new technique that if applied in the correct context can result in successful results. Appropriate interventions for implementation are required and should possibly be explored in smaller ARV clinics for first mover advantages. It is important to note that a careful monitoring and evaluation plan should also be implemented taking into account the impact of AI on adherence to unleash the full potential and value of this adherence initiative.

## CONCLUSION

A great deal can be gleaned from ARV programmes. The utilisation of AI as a Best practices clinic should be developed to enhance and improve approaches to care and referral to care. ARV programmes can only grow

from strength to strength if supported by similar tools, frameworks and approaches toward holistic integrated care.

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# Recommendations for HIV-AIDS Programme Management Indicator Development

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## ABSTRACT

HIV-AIDS continues to grow as the largest emergent epidemic across the world with some of the highest disease burdens prevailing in developed and developing countries. UNAIDS estimates 36.7 million people living with HIV-AIDS in 2017<sup>6</sup>. 20.9 million people were living with HIV-AIDS on antiretroviral therapy and 1.8 million people newly infected with HIV in 2017<sup>4</sup>. These global statistics demonstrate the major global public health issue that HIV-AIDS is. In response to the epidemic, HIV-AIDS programmes have sprung up almost instantaneously across global and local private, public and non-governmental sectors in efforts to curtail the epidemic. This fragmented approach has culminated in various levels of HIV-AIDS programme management; with a sectoral view to indicator development. This paper reviews current HIV-AIDS programme management indicators and proposes recommendations to enhance smart practices.

**Keywords:** *HIV-AIDS, antiretroviral therapy, indicators*

## INTRODUCTION

HIV-AIDS has become the leading health concern in South Africa since its discovery almost thirty years ago. UNAIDS estimates almost 270 000 new infections per year in an epidemic that is growing at a fast pace<sup>6</sup>. Most newly acquired infections occur in young females of child bearing age which appear to bear the brunt of this disease. This is also impacting the rate of transmission from mother to child. The current HIV-AIDS strategic plan aims to reduce mother-to-child transmission of HIV rates to under 2% at six weeks after childbirth and less than 5% at 18 months<sup>1</sup>. In order to meet the prevention and treatment needs of the HIV-AIDS epidemic, South Africa took great strides to pride itself on the development of the largest HIV-AIDS treatment programme globally. The programme boasts almost 7 million adults on the programme receiving lifesaving ARVs. This programme is provided by the South African public health sector. The Non-governmental

sector and the private sector also boast similar HIV-AIDS programmes but not of the same magnitude. These are seen predominantly as complementary programmes for other sectors. The growth in number of HIV-AIDS programmes across the various sectors has resulted in many patients being enrolled and being managed on the programme, however accurate statistics in terms of reporting for monitoring and evaluation remain at large. It is important that consistent indicators are utilised across multisectorial programmes to harness the best practises for HIV-AIDS management.

Indicators are integral markers of monitoring and evaluation for HIV-AIDS programmes. These allow managers to track and evaluate the programme performance and allow the programme to be compared over time and to other similar programmes. Programmatic indicators are intended to monitor key interventions to ensure that the programme can be monitored and evaluated.

## METHODOLOGY

A retrospective review was undertaken of the South African HIV-AIDS local and global regulatory frameworks to assess current indicators in place for management of HIV-AIDS programmes. The review

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revealed that several indicators exist but these are sector specific. These indicators are valid, reliable and are free from bias but cannot be applicable beyond the sector they were intended for use in. It is therefore appropriate that a set of core indicators be developed applicable for use across multiple sectors.

## RECOMMENDATIONS

Data reviewed revealed a paucity of a single indicator measure which may be applicable to public, private and non-governmental sectors. It is thus recommended that key measures be developed per management category to enhance the management of HIV-AIDS programmes. These will include indicator development for clinical, laboratory, pharmacy, budget and, administration. Other indicators will include education, awareness and advocacy. Clinical indicators to be considered should be divided in to clinical indicators for HIV prevention, HIV treatment and HIV related mortality and morbidity <sup>7</sup>. These are important as they provide concise data which can inform if the programme is being managed optimally or not. Patients managed in a clinically appropriate manner on the programme tend to progress less quickly to poorer outcomes, it is therefore imperative that these clinical indicators are highlighted to ensure ill patients are prioritised for care and wellness.

Laboratory indicators should entail the following key focus areas covering HIV testing rates for new infections, rate of uptake of HIV testing in the communities, compliance to real time disease monitoring testing as required together with clinical appropriateness and cost effectiveness<sup>3</sup>. Laboratory indicators are important as they provide factual evidence based information for disease monitoring, disease progression and disease prognosis. Clinical appropriateness of testing is also an important consideration in that it determines the clinical acumen of clinical staff resulting in areas for training and improvement for learning and development. Cost effectiveness of testing is critical especially in resource limited settings, so HIV-AIDS programmes must ensure that all requested laboratory testing is done in accordance with testing protocols in order to optimally manage budgetary constraints.

Pharmacy indicators should cover all aspects of good pharmacy practices of the programme. These include monitoring the uptake of adults and paediatrics on antiretroviral therapy, monitoring the uptake of

adults on HIV pre-exposure prophylaxis, use of other complementary medications and effective stock control indicators. These indicators are important as they inform statistics from the community, district to national level. Stock control indicators and measures thereof are vital to ensure efficiently run HIV-AIDS programmes<sup>8</sup>. Ensuring HIV-AIDS programmes have pharmacies with adequately stocked medications is a critical step to ensure continuous supply of the lifesaving monthly medication.

Budgetary and administrative control is important to ensure that appropriate and accurate indicators are devised <sup>5</sup>. Indicators for input costings and previous funding's should be evaluated on a monthly, quarterly and annual basis and should be reflected in the programme's financial reports. Salaries and consumables over current funding's would also be evaluated. Administrative support is integral to ensure that the financial and budgetary indicators are evaluated timeously. Education, awareness and advocacy indicators are perhaps the most important and valid across the public, private and non-governmental organisation managed HIV-AIDS programmes. These indicators would explore the amount of community outreach undertaken in communities, districts and national regions in terms of HIV-AIDS education and awareness. These are important as this translates into the uptake for HIV testing and uptake of treatment as well.

## CONCLUSIONS

Efficient monitoring and evaluation of HIV-AIDS programmes with suitable and appropriate indicators will allow for accurate resource allocation and timeous stock control to allow for cost effective outputs. Clinical, pharmacy laboratory and budgetary indicators applicable to public, private and non-governmental sectors will allow for a consistent and standardised approach to patient health and community wellbeing.

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# Prospective Lung Transplantation in Indonesia: Lung Donor Preparation, Preservation, and Allocation

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## ABSTRACT

The development of lung transplantation centers in a developing country like Indonesia is challenging. Increased morbidity and mortality of end stage pulmonary disease necessitates the availability of lung transplant facilities. Prior the programmes, an effective donation system should be developed to ensure the availability of organ donors. We propose an effective organ donation system for Indonesia, especially for lung transplantation. In building the National organ donation system, the beliefs of diverse cultures and religions should be considered. Credible human sources is the key to succeed in the development of an effective organ donation system.

**Keywords:** Lung transplantation, organ donation, organ donation system, organ donor preservation, ethical issue.

## INTRODUCTION

Following the many advancements in lung transplantation, recipients today are able to obtain satisfactory improvements in survival rate and quality of life.<sup>1</sup> Unfortunately, the number of health care facilities that provide lung transplant services does not fulfill the current demand.<sup>2</sup> One major problem reported by all lung transplant centers is the shortage in lung donors.<sup>3,4,5</sup> In general, there are two types of lung transplant donations: deceased organ donation and living lobar donation.<sup>6</sup> The latter hasn't attained much popularity as compared to first, primarily due to complexity of the procedure involved.<sup>7,8</sup> On the other hand, not every country has the capacity to develop a deceased organ donation system. To build this system, a country should have a well-developed infrastructure; sufficient financial support; supporting ICU; and strong legal support to declare brain death, and consent for organ donation.<sup>9</sup> The preparation, preservation, and allocation of donor lungs are challenging processes, will be the same in a

developing country like Indonesia. Therefore, this script aims to assess a suitable organ donation system for lung transplantation in Indonesia.

**Donor for Lung Transplant:** Developing a good donation system plays a significant role in a transplantation center.<sup>10,11</sup> To ensure the lungs have suitable quality, donors should fulfill the standard donor criteria, as described by Erasmus ME, et al.

Therefore, an extended donor criteria has been suggested. However, the standard criteria is still used as preparation of suitable organs, as determined by the extended donor criteria, requires advance preservation techniques which is not available in all transplantation facilities.<sup>7</sup>

**Living lobar donation:** A donor should be in excellent health with adequate pulmonary reserve for lobar donation. Furthermore, they may be parents, siblings, or extended family members of the recipient, or even unrelated individuals who have an emotional attachment to the patient, and are willing to accept the risks associated with organ donation, without coercion.<sup>7</sup>

**Deceased organ donation:** Deceased organ donors include brain-dead or cardiac arrest patients.<sup>12</sup> Organs from a brain-dead patient is called donation after the determination of brain death (DBD),<sup>12</sup> whereas donation

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following circulatory death or cardiac arrest is known as donation after the determination of cardiac/circulatory death (DCD/DCDD). For simplicity, DCD is more commonly used than DCDD.<sup>12</sup>

**DBD:** Brain death is clinical diagnosis of an irreversible coma.<sup>13,14</sup> However, reversible brain death after cardiopulmonary arrest induced by hypothermia has been reported in 2011 by Webb AC, et al. The reversal was transient and did not impact patient prognosis.<sup>15</sup> Hence, the study suggested that in patients with hypothermia induced brain death, confirmatory testing should be considered, and a minimum observation period after rewarming should be completed before brain death testing is conducted.<sup>15</sup>

Guidelines for brain death determination varies among countries. Some countries use only the clinical examination, while others use ancillary tests, such as EEG, MRI/CT angiography, or other blood examinations.<sup>13</sup> Some countries in Europe and America even implement a repeat confirmation test with a 6-hour interval.<sup>14,16</sup> The confirmatory test is reported to be suitable for patients where specific components of the clinical tests do not deliver a reliable result. In contrast, the others countries state that an additional confirmatory tests would only damage the organ used for donation, but have no benefit for the donor as a patient.<sup>14,16</sup>

**DCD:** The concept of using DCD donors for lung transplantation remains controversial due to concerns over specific lung injuries that usually occur during the warm is chemic time (WIT), the time between circulatory arrest, and the organ preservation procedure.<sup>8</sup> For predicting the possibility of injuries, DCD may be classified based on the chronology of death by using a system, such as the Maas tricht classification.

In the practice of deceased organ donation, a well-established network among hospitals is required to provide information about the availability of potential donors.<sup>17</sup> Potential donors are reported to an organization that is responsible for organ preservation and distribution, which is known in many countries as the Organ Procurement Organization (OPO). For every prospective donor, the procurement organization will search for evidence of organ donation status. If the donation status is not known, if possible the procurement organization then seeks the consent of donation from an authorized individual.<sup>10,17</sup>

When organ donation status is confirmed, the OPO will coordinate with the Organ Procurement and Transplantation Network (OPTN), an organization responsible to make a prioritized list of potential recipients from the national organ waiting list. OPO would inform the OPTN about the potential donors, and the OPTN would then provide information to the OPO regarding the type of organs required for transplantation, based on the available wait-list.<sup>17</sup> Organs or tissues that will be donated are procured by taking the necessary screening, testing (for the availability), processing, storing, and distributing steps, as required for transplantation, or in some cases for research and education purposes. All processes must be done expeditiously.<sup>17</sup>

### Donor preparation

**Donation consent:** Consent for organ donation is ideally made by the correspondence during his/her life time. It maybe facilitated by several organizations or healthcare agents according to the laws in the country. Some countries use hospitals, organ procurement organizations, government organizations, etc, as an agent for collecting organ donation consent.<sup>17</sup> A witness is required when obtaining oral consent.<sup>17</sup> For a deceased individual who made no lifetime choice regarding donation, the authorization for providing consent is referred to a list of possible persons. The list of authorized individuals should be regulated by the laws of the respective country. For example, the “anatomic gift act” implemented in the United States authorizes a variety of possible individuals to provide consent on behalf of the deceased.<sup>17</sup> For a living donor, consent should be collect from the donor-self. The donor may be parents, siblings, extended family members, or unrelated individuals with an emotional attachment to recipient.<sup>7</sup> If the donor is found to feel pressurized regarding donation after careful consultation and explanation, the donor status is denied, even though the consent has been given. The reason would be defined as “unspecified” to avoid any conflict between the family, recipient, and potential donor.<sup>7</sup>

**Lung preservation:** There is a difference in the preservation process for brain death donors and circulatory death donors. The main principle is to start the organ preservation immediately after the death is determined to prevent any additional injury during the critical time. As brain death is determined, the patient has no right to receive further therapy, except for the purposes of organ preservation.

**Organ distribution:** Organs are distributed based on the recipient listing. Each recipient should have equal opportunity to access organs available for transplantation. The ISHLT has suggested to make the recipient listing based on the Lung Allocation Score (LAS) system for lung transplantation purposes.<sup>21</sup> However, if the national system for lung transplantation is not well-prepared, the transplantation maybe done electively.<sup>22</sup>

Principle of the LAS system is giving priority to recipients with higher transplant urgency and benefit.<sup>6,21,23,24</sup> Transplant urgency is the expected number of days lived without transplant, whereas transplant benefit is the expected number of days lived in the first year post-transplantation. Factors associated with transplant urgency and benefit prediction within one year are calculated to produce a number on a scale from 0 to 100. The calculator can be accessed in <http://optn.transplant.hrsa.gov>. Higher urgency and benefit is represented by a low score.<sup>23</sup>

Other than urgency and benefit, donor lungs should be distributed based on the recipient suitability. Conventionally, ABO and HLA compatibility alone are used as the validating criteria for organ matching. However, many studies have reported that size, gender, and race mismatch has significant impact on transplantation outcome.<sup>5,25</sup> Matched race increases survival rate within CF, IPF and single lung transplants, but no change in rejection rates. African-american lungs donor are associated with higher risk of mortality, regardless of the recipient race.<sup>5</sup>

**World donation system:** Each country has different regulations regarding organ donation. Some use the “option in” system, while others use the “option out” system. In the “option in” system, organ donation is permitted only when an individual has agreed to donate their organs. In contrast, in the “option out” donation system, every individual has given “presumed consent” to donate their organs, unless refusal to be a donor is evident by a legal statement.<sup>16,26</sup> In the Western Pacific and in Africa, the donation system varies depending on the laws and agreements in the associated country.<sup>17</sup>

**Ethical issues:** Similar to other medical practices, the transplantation and organ donation system should abide by the prevailing bioethics values. Addressing the urgent and growing controversies in illegal organ sales, transplant tourism, and trafficking of organ donors, the Istanbul

meeting was held, and the Declaration of Istanbul was made, an International agreement with regard to organ donor and transplantation.<sup>27,28</sup> Every country has the authority to decide the organ donation system, though the system should be consistent with international standards, as stated in the Declaration of Istanbul.<sup>28</sup>

The practice of organ trafficking, transplant commercialism, and transplant tourism are now considered unethical and definitely prohibited.<sup>27</sup> The practice of organ trafficking include all processes related to organ transfer from a living or deceased donor by means of the threat, force, or other forms of coercion, abduction, fraud, deception, abuse, power, or of the giving to, or the receiving of third party payments or benefits to achieve the transfer of control over the potential donor, for the purpose of organ exploitation for transplantation.<sup>28</sup> Transplant commercialism refers to the policy or practice in which an organ is treated as a commodity, including its purchase, sale, or use for material gain.<sup>28</sup> Transplant tourism is the provision of transplant to patients from outside a country, involving the practice of organ trafficking and/or transplant commercialism.<sup>28</sup>

Another important ethical issue is transplant corruption. Transplant corruption refers to any illegal action in every process of organ distribution and allocation, with the intention of personal gain. Therefore, transparency of organ distribution is required.

In addition to the Declaration of Istanbul, the WHO has developed the Guiding Principles for organ transplant and donation in 1991.<sup>28</sup> The guide has been updated in 2004 with regard to the issues and challenges in organ transplantation, as described above. In the WHO Guiding Principles, deceased organ donors are preferred over living organ donors due to the potential practice of unethical organ utilization of living organ donors. A clear definition and determination of death is needed to avoid any legal threats.<sup>27</sup> Genetic related donors are preferred over unrelated living donation, an effort to increase the willingness of relatives or individuals close to the recipient to donate their organs.<sup>27</sup> The system should ensure the presence of informed consent for all deceased and living donors, as a practice in the principle of autonomy. Informed consent can be attained from the donor-self, or an authorized individual, as per the prevailing regulations in the country.<sup>9,27</sup>

**Indonesia potentiation:** Indonesia has the capacity to declare brain death since 2009.<sup>29</sup>The laws stated in: (1)Health Legislation No. 36 in year 2009 part 18 subsection 117-123 on cadaveric surgery for education and transplantation purpose;<sup>29</sup> (2) Ministry of Health regulation No. 37 in year 2014 on the declaration of death, and organ utilization.<sup>30</sup>Brain death maybe declared following the examination of at least 3 doctors, including one neurologist and one anesthesiologist in the ICU. <sup>29</sup>Unfortunately, in Indonesia, only a few hospitals have capacity to declare brain death due to the lack of facilities, including the absence of an ICU and unavailability of the required specialists. Moreover, some hospitals refuse to declare brain death despite availability of the required facilities, primarily because physicians are unfamiliar or not confident with their ability to declare brain death.

**Less in infrastructure:** independent organizations like OPO and OPTN; advanced program for recipients listing and organ distribution; local hospital networking, supporting human sources; advanced organ procurement facilities; and organ transportations. Financial support is needed to build the supporting infrastructure, including the supply and maintenance of such facilities; for conducting meeting, training program, and workshop for involved human resources; building internal and external network system; funding donor organ removal and distribution processes before paid by the recipient/health insurance. Within the supporting infrastructure, the availability of appropriate human resources is the most important aspect of a success organ donation system, as reported in a retrospective study by McVicar JP, et al (2003).<sup>10</sup>

In conclusion, the major challenge in developing a lung transplantation program is the shortage of organ donors. Therefore, a good organ donation system is needed prior to the development of lung transplantation program. Deceased organ donation is preferred to living organ donation for lung transplantation purposes. Besides supported financial and infrastructure, credible human sources is the main factor to succeed the development of an effective organ donation system.

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# Factors Causing Infant Mortality in Surabaya

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## ABSTRACT

Infant Mortality Rate (IMR) is an indicator of reference in the *Sustainable Development Goals* (SDGs) set by the *United Nations* and has become the goal of health development to be achieved all over the world. The infant mortality rate that needs to be achieved is the decreasing rate of infant mortality to 12 per 1000 births. Based on the data from East Java Provincial Health Office in 2010-2016, it is known that there has been a declining mortality rate from 29,9 per 1000 births to 23,6 per 1000 births. Meanwhile in Surabaya, infant mortality seems to be fluctuative from 2013 until 2016. Under cases taken from 30 respondents taken in some Health Care Center Service in Surabaya, it was found that the factors that led infant mortal cases to happen was the mother and the infant itself. In the case where mother as the factor of infant death relate directly to the knowledge, behaviour, distance, and also income that affect the frequency of healthcare visit to check the pregnancy. There are 46,6% low knowledged mothers and do not check the pregancy routinely experience infant death during delivery. Meanwhile, in the case where infant as the factor is the case of Low Birth Weight where 56,6% infants experiencing Low Birth Weight did not survive during the delivery.

**Keywords:** *infant mortality, knowledge, behaviour, distance, income*

## INTRODUCTION

Infant Mortality Rate (IMR) is an indicator of refference in the *Sustainable Development Goals* (SDGs) set by the *United Nations* and has become the goal of health development to be achieved all over the world. The infant mortality rate that needs to be achieved is the decreasing rate of infant mortality to 12 per 1000 births. Based on the data from East Java Provincial Health Office in 2010-2016, it is known that there has been a declining mortality rate from 29,9 per 1000 births to 23,6 per 1000 births<sup>1</sup>.

Efforts to lower the mortal rate done by the health department was *Making Pragnancy Safer* (MPS) started from 2000 to 2010 which focuses on aces to healthcare services, service to routine *antenatal care*, and supports from related stakeholders<sup>2</sup> Infant death can happen due to the lack of mother's awareness of healthy pregnancy. Many factors affect infant death, one of them is; mothers rarely check their pregnancy. According to several researches, why do mothers rarely check their pregnancy is because they lack knowledge of healthy pregnancy. Appropriate to the research done by<sup>6</sup>, it is said that why mothers rarely check their pregnancy is because they lack of pregnancy knowledge.

Pregnancy check on pregnant mothers should be done 4 times since the start of pregnancy until the delivery<sup>3</sup>. Other factor causing infant deaths is underaged pregnancy, and access to healthcare services. In indonesia, 69,7 millions of women get pregnant by the age of 15 to 49 years old, and in the East Java province, 10,45 millions of women get pregnant by the age of 15 to 49 years old.

Besides, the unhealthy condition during the pregnancy can also affect the infant like physical factor, psychological factor, environmental factor, social, and culture<sup>4</sup>. the general purpose of research is to analyze the cause of infant mortality in Surabaya. This research expects to be an input in planning and implementation of programs in future times.

## RESEARCH METHOD

This research categorizes as observational research. Considered by time, this research is *cross sectional* because it was a one-time observation. This research was conducted on kecamatan Sememi, kecamatan Wonokusumo, kecamatan Pucang Sewu, kecamatan Jagir, and kecamatan Wiyung where all the respondents of the research settle in Surabaya.

The population of research are all mothers with death infants in puskesmas with 30 samples of mothers with death infants. The variables and operational definitions of this research are:

- (a) Infant mortality is defined as baby less than a year who dies.
- (b) Age during pregnancy is the living period until prenatating the baby dies in one year time.
- (c) Education is the process of changing last formal behavior that others do.
- (d) Knowledges are thing that are kn own to mothers about pregnancy and infants.
- (e) Expenditure is the income earned by the respondent each month in Rupiah units.
- (f) BBLR is low birth weight babies under normal that is <2500gr
- (g) Distance is far away residency in kilometers to get health service
- (h) Ttransportation is a vehicle used to obtain health services
- (i) Attitude is the thinking and decision-making of respondents to health services
- (j) Antenatal frequency is the number of mothers coming to health services to obtain maternal and infant health services.

Data were analyzed using quantitative approach using data processing application.

## RESEARCH RESULT

### 1. Maternal Factor

**Table 1: Characteristics of some mothers that influence infant mortality are education, knowledge, attitude, distance, transportation and antenatal frequency**

Maternal Factor	Amount	
	N	%
<b>Education</b>		
Low	16	53,4
High	14	46,7

Conted...

<b>Knowledge</b>		
Bad	26	86,7
Good	4	13,3
<b>Behaviour</b>		
Negative	17	56,7
Positive	13	43,3
<b>Distance</b>		
Near	18	60
Far	12	40
<b>Transportation</b>		
Private	18	60
Public	12	40
Frequent	12	40
Unfrequent (<4 times during pregnancy)	18	60
<b>Income</b>		
Minimum Wage (Rp. 3.583.312)	26	86,7
Above Minimum Wage (>Rp. 3.583.312)	4	13,3

### 2. Baby Factor

**Table 2: Infant mortality resulting from the infant factor is low Birth Weight (LBW) or BBLR.**

BBLR Case on Infant Death	Amount	Percentage (%)
BBLR	17	56,6
Non BBLR	13	43,3
Total	30	100

## DISCUSSION

**1. Maternal Factor:** Deaths in infants occurring in Surabaya are most prevalent in mothers with a high education level seen in 46.7% of mothers in infant cases. While mothers with low education level as much as 53.4%. It can be concluded that the level of education is a major factor in maternal factors that cause death in infants. The provisions embedded by the research undertaken by<sup>5</sup> in the definition that education level is one of the factors that make up mortality in infants.

The level of education of mothers should be balanced with the level of information about pregnancy care and infant care. It is seen in the

results of research on pregnancy and infant care as much as 13.3% of mothers have a high knowledge of pregnancy and infant care. While mothers who with low level of knowledge as much as 86.7%. Maternal knowledge is one of the factors that cause death in infants. Directly related to attitudes and behaviors, the frequency of mothers performing antenatal care also with distance and income of the mother. It is seen as many as 60% of mothers have a long home distance from the health care services. While as many as 40% of mothers have short home distance

with health services. With 86.7% of mothers have Regional Minimum Wage income of Surabaya (Rp 3,583,312) and 13.3% mothers have income exceeding Regional Minimum Wage income of Surabaya (Rp 3.583.312).

56,7% mothers showed positive response and 43,3% mothers showed negative response with antenatal frequency counted 40% routine mother 4 times during pregnancy and as many as 60% of unroutine mothers do the antenatal <4 times during pregnancy. After analyzing the relationship between attitudes and frequency it is seen:

**Table 3: Relationship Between Mother’s Attitude With Frequency of Antenatal Occurrence**

Response	Antenatal Frequency				Total	
	Routine	Percentagw (%)	Unroutine	Percentage (%)	Amount	Percentage (%)
Positive	4	13,3	9	30	17	56,6
Negative	3	10	14	46,6	13	43,3
Total	7	23,3	23	76,6	30	100

It is seen from table 1.1 the positive response of the mother does not affect the decision making to perform the antenatal care. A total of 46.6% of mothers with positive response did not routinely perform antenatal care. Regulation from the Ministry of Health Number 97 of 2014 Concerning Pre-Pregnancy Health Services, Pregnancy, Labor and Delivery Period, Contraceptive Services, and Sexual Health Services which states that mothers normally perform antenatal care 4 times during pregnancy starting from the beginning of pregnancy. Reinforced by a pregnancy manual released by<sup>2</sup> which explains that antenatal care in pregnant women is important to prevent the occurrence of infant mortality at delivery of funds after delivery.

Habits of mothers who consider that pregnancy is an event commonly experienced by all women in the world makes the willingness of mothers to find information about health and pregnancy health in infants after birth is reduced. It is seen that the mother’s knowledge is as low as much as 50%. This lacking of knowledge affects attitudes that directly affect maternal behavior in antenatal care. Mothers who perform antenatal care less than 4 times during pregnancy is a strong potential derived from mothers who will cause death in infants at birth and after birth.

**2. Baby Factor:** Baby factors that cause the occurrence of infant mortality in Surabaya is mostly due to Low Birth Weight (LBW) than infants who are not LBW. The percentage of infant mortality with BBLR was 56.6% while those who were not affected by LBW were 43.3%. The results show that the greatest infant mortality occurring as a result of LBW was in fact consistent with many studies in various countries. WHO writes in the WHA Global Nutrition Targets 2025: The Low Birth Weight Policy Brief of more than 20 million births worldwide died of LBW with 1.1 million LBW deaths occurring in the first few hours of early birth.

Food intake, lifestyle, pregnancy during youth and mother’s behavior to get pregnancy care services are most influential so that the baby factor is found when the baby’s death occurs.

**CONCLUSION**

1. Infant mortality factor that occurred in Surabaya City caused by factor that happened because of maernal and baby factor.
2. Infant mortality factors that occur due to maternal factor, including; level of education, level of knowledge, response, distance, and the amount of expenditure that mothers do during pregnancy

that affect the behavior of mothers seeking care services of pregnancy. As many as 46.6% of pregnant women are lacking of knowledge who do not routinely check their pregnancy. Pregnancy care in accordance with what should be obtained by the mother during pregnancy is as much as 4 times of pregnancy care during pregnancy until childbirth. Regulation of the importance of pregnancy examination should be enforced by the government so that the examination of pregnancy is considered to be a necessity by pregnant women. Enforcement of the regulations should be monitored for implementation and evaluated periodically. Supervision during the implementation can be done by health center midwives in charge of the area or mothers cadres puskesmas spread over every RT in an area. Evaluations are conducted quarterly with the assumption that infant mortality can be prevented and the case may decrease according to the target set by the SDGs.

3. Infant mortality factor that occurs in most infants happen due to infants born with low birth weight under 2500gram with a total of 56.6% associated with maternal factors. To reduce the infant mortality factor due to LBW, what can be done by each individual (pregnant mother) is to pay attention to lifestyle (nutritional intake during pregnancy, cigarette and alcohol consumption, and excessive drug usage), to pay attention to personal hygiene, and home hygiene, home

environment directly related to sanitation. While what can be done by central and local government is to educate pregnant women related to pregnancy health and infant health at the time of birth.

**Ethical Approval:** Related departments should be assured about the confidentiality of the result of questionnaires

**Conflict Interest:** The authors report no conflict of interest.

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# The Association between Short Nap and Memory Performance Using Concise Learning Method and Logical Learning Method among Private University Students in Selangor, Malaysia

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## ABSTRACT

In the present high-tech environment, achieving academic goals become competitive among university students. Students are afraid of failing in exams. They are awake for 16 hours or more a day without a nap. Students have programmed their mindset or believe that staying awake for long hours in a day can achieve their goals. This study analyzed the association between short nap and memory performance among private university students in Selangor, Malaysia. Five hundred respondents in two different equal groups were selected randomly to be involved in this study. Concise and logical learning methods were used to achieve the objectives. A short briefing was given to the participants before subjects start the memorizing task that consists of concise and logical learning for one hour. Then, two hundred fifty respondents (sleep group) were sent to the skill lab for nap session, and the other two hundred fifty respondents (awake group) remained in the classroom. After one hour, both groups tested on memory recall for 30 minutes. Data were analysed using one-way MANOVA which revealed a significant multivariate main effect for independent variables group Wilk's lambda =0.61,  $F(12,39.00)=12.0$ ,  $p<0.001$ , partial Given the significance of the overall test, the univariate main effects for independent variables were obtained for percentage of concise learning method:  $F(11,33)=11.39$ ,  $p<0.001$ , and for the logical learning method,  $F(23,67)=23.62$ ,  $p<0.001$ , and for total scores  $(22,19)=22.24$ ,  $p<0.001$ . Significant independent group pairwise differences were obtained in the number of 500 respondents between sleep group and awake group. Mean score number awake group were 3.95 and mean of sleep group 8.23. In conclusion, there is a significant association of memory recall test scores between student intervening short nap and student without intervening short nap using concise and logical learning method.

**Keywords:** Nap, Memory Performance, Concise, Logical Learning, University Students

## INTRODUCTION

Achieving academic goals become competitive among university students and they are awake for long hours without a nap because they have programmed their mindset. Shorter sleep duration led the students to feel sleepy during the day, tired, drowsy, moody and had a

difficult time in getting up in the morning<sup>(1)</sup>. Napping has the potential to enhance people's lives<sup>(2)</sup>. Napping helps clear out the brain's inbox and integrates information into our brain memory<sup>(3)</sup>.

Short-term or working memory doesn't need to store everything we perceive. Most information is only required for a short time and can then be discarded<sup>(4)</sup>. Short-term memory holds information for few seconds to a few minutes, and this kind of memory is often referred to as working memory; it allows us to understand information as we were encountering it and then discard it. This system is constantly updating, focused on data we need at that particular moment in time<sup>(5)</sup>.

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It's important to understand the difference between learning and memory; they are closely linked concepts. As we make our way about the world, we encounter new procedures, ideas, faces, and names and during wakefulness, activity in the brain is fast and chaotic. But during slow wave sleep, the electrophysiological waves of activity where all neurons fire together in a languid rhythm and the sleep's primary function is to consolidate memories or to encode the important parts of your daily learning, so it is stored for the long-term<sup>(6)</sup>.

There are different types of naps. The 10-20 minutes nap is known as the power nap. It is best for getting straight back to work. The 26-minute nap is known as Nasa nap. It was proven to improve pilot performance 84% and alertness by 54% it is suitable for a day after working hours. The 30 minutes nap also called as the bad nap. It causes sleep inertia (sleep hangover) for up to 30 minutes before restorative benefits kick in. It is best to avoid, if possible. The 60 minutes nap is called a slow wave sleep nap. It helps cognitive memory processing, remembering places, faces, and fact. It is best before a big presentation or important meeting. The 90 minutes nap is the full sleep cycles nap. It boosts creativity, emotional memory, and procedural memory. It is beneficial to an impending project deadline or big test<sup>(7)</sup>. The ideal nap time is between 1 pm and 4pm<sup>(8)</sup>. The perfect nap position is slightly upright to avoid deep sleep. The excellent nap light is dim to dark to stimulate melatonin production from the brain's pineal gland<sup>(9)</sup>. Regular and restful sleep is an essential component of good health maintenance and resiliency<sup>(10)</sup>. Recent studies show even power nap of 20 minutes to 30 minutes can help to feel re-energized, improve mood, alertness and cognitive performance<sup>(11)</sup>.

According to the national sleep foundation 2017<sup>(7)</sup>, Humans are part of the minority of monophasic sleepers<sup>(12)</sup>. The effect of sleep on memory consolidations has received considerable attention<sup>(14)</sup>. Several experimental studies showed that a short nap is enough to improve learning success significantly. These studies have consistently confirmed that napping during the day improves objective and subjective alertness, memory, cognitive functioning, psychomotor performance and even mood<sup>(15-21)</sup>.

## METHOD

This study was conducted at Management and Science University (MSU) which is a private university located

in Selangor State, Malaysia. Twenty-one beds provided by the University's skill lab. Hence 250 respondents have been assigned to a sleeping group and, another 250 respondents have been assigned to wake group.

Respondents recruiting have begun after the ethical approval of the study proposal from the University Research Committee. A cover letter was attached to each consent in order to assure that the participant's information is confidential. Permission was taken directly from the respondents by filled the consent form then collected data were obtained in the university skill lab.

The participant subjects were selected by random sampling method. A cross-sectional selection method was used according to the study design. This study targeted the university students from different courses. A pre-registration booth opened on 2<sup>nd</sup> and 3<sup>rd</sup> August 2016 at the university. A total of 809 students were registered as volunteer respondents for this study.

Among them, 500 respondents were randomly selected to proceed for data collection. The selected 500 respondents were randomly divided into two different groups by giving two different color ribbons. The purple color ribbon was assigned to the awake group, and the green color ribbon was assigned to the sleeping group.

The respondents were given a short briefing on the study procedure as well as the inclusion and exclusion criteria to avoid any bias during the data collection. The exclusion criteria include failure to follow the instructions, those with sleep impairments, those with a history of insomnia, those with typical sleep patterns, drug usage, those on herbal and pain relief medication, using electronic device usage like Smartphone and taking caffeinated drinks on the day of data collection.

After the briefing, memorizing task was given for the 500 respondents (both the awake group and the sleeping group). The memorizing task consists of concise learning and logical learning. Respondents allowed memorizing on both learning method for one hour and then the 250 respondents (sleeping group) were sent to skill labs for nap session. The other 250 respondents (awake group) remain in the classroom for video session (Mr. Bean show). This procedure conducted simultaneously for one hour. After one hour, both groups tested on memory recall. The memory recall test conducted for 30 minutes. The test includes fill in the blanks answering scheme after viewing certain

diagrams to find out the memorizing ability and to mark each correctly memorized item with one mark and to get the total score from such method. The tests used are Standardized Memory Assessment Scoring Scales, which is of two types; first, Woodcock-Johnson III scoring scale and second, Memory Assessment Scale-J. Michael Williams<sup>(22)</sup>.

**RESULTS**

This study was observational and interventional which was conducted among university students from different departments and different sociodemographic characteristics. The descriptive analysis shows the number of respondents randomly divided into two different groups; sleep group and awake group.

**Table 1: One-way MANOVA comparing the short nap group and awaking group using concise learning method and logical learning method**

Multivariate Tests (One-way MANOVA)								
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Observed Power
SHORT NAP	Wilks' Lambda	0.61	11.98	2.00	39.00	<0.001	0.38	0.99

A one-way MANOVA revealed a significant multivariate main effect for region, Wilks' lambda = 0.619, F (12, 39.000) = 12.0, P<.001, Partial eta squared = 0.38. As a conclusion from the table above, there is a significant association of memory recall test scores between students intervening short nap and student without intervening short nap using concise learning method and logical learning method.

**Table 2: The univariate tests for the effects of a short nap on each of the different dependent variables**

Source	Dependent variable	Type III sum of squares	Mean square	F	Sig	Partial eta squared	Observed power
Short Nap	Concise learning method	32.59	32.59	11.39	0.002	0.22	0.90
	Logical learning method	66.88	66.88	23.62	<0.001	0.37	0.99
	Total score Logical and concise	192.85	192.85	22.24	<0.001	0.35	0.99

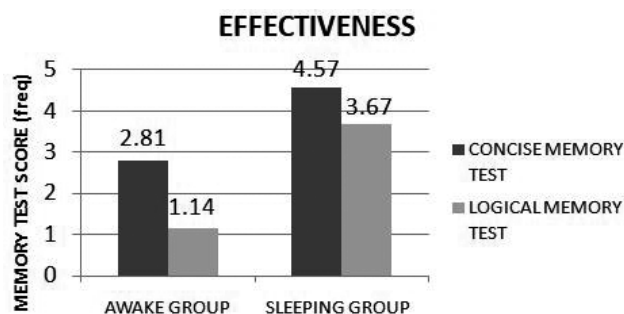
The above table indicates the univariate tests for the effects of a short nap on each of the different dependent variables. It shows that short nap had a significant effect on the results of concise memory test score (p= 0.002), the result of the logical memory test score (p=<0.001) and the total memory test score (p=0.000).

**Table 3: Pairwise Comparisons**

Pairwise Comparisons							
Dependent Variable	(I) Sleep Group Or Awake Group	(J) Sleep Group Or Awake Group	Mean Difference (I-J)	Std. Error	Sig. <sup>b</sup>	95% Confidence Interval For Difference	
						Lower Bound	Upper Bound
Concise Learning Method	Awake	Sleep	-1.762*	0.522	0.002	-2.817	-.707
	Sleep	Awake	1.762*	0.522	0.002	.707	2.817
Logical Learning Method	Awake	Sleep	-2.524*	0.519	<0.001	-3.573	-1.474
	Sleep	Awake	2.524*	0.519	<0.001	1.474	3.573
Total Score Logical And Concise	Awake	Sleep	-4.286*	0.909	<0.001	-6.122	-2.449
	Sleep	Awake	4.286*	0.909	<0.001	2.449	6.122



In the pairwise comparison result, the third column gives the difference in mean values between the compared groups. The differences that are significant at 0.05 levels are marked with an asterisk sign. The P-values for the mean difference is given in the column “sig”. The 95% confidence intervals for the mean difference are given in the last two columns. Here in the comparison of concise learning with short nap pair, logical learning with short nap pair and total score with short nap pair shows the significant mean difference with a significant P-value (<0.05). The 95% confidence interval for mean differences does not contain the value of zero. Thus, there is an association between pairwise comparisons.



**Figure 1: Effectiveness of short nap on the Concise and Logical memory tests.**

Figure (1) shows the effectiveness of short nap on memory performance. Respondents intervening short nap able to score higher in both types of learning methods compared with respondents without intervening short nap. Both, respondents intervening short nap group and respondents without intervening short nap group, were able to achieve good scores in concise learning method compared to logical learning method.

## DISCUSSION

The mean difference of total Memory test scores revealed that awake group equals to 3.95 scores and the sleeping group equals to 8.24 scores. This result shows that the students in the intervening short nap able to recall better than the students without intervening short nap. Our result is in agreements to those reports by previous studies<sup>(23-27)</sup>. Studteet *al.* in 2015 proved that nap sleep preserves associative but not item memory performance and they mentioned: “Those who napped between 45 to 60 minutes after the learning task, performed five times better at remembering word pairs compared to the awake group”. Again, Igloiet *al.* in 2015 showed that post-learning sleep promotes the selectivity of long-

term memory consolidation. They found that memories are better retained when tested three months after initial encoding and also remembered with higher subjective confidence<sup>(25)</sup>.

A one-way MANOVA revealed a significant multivariate main effect for region, Wilks’ lambda = 0.619,  $F(12, 39.000) = 12.0$ ,  $P < 0.001$ , Partial eta squared = 0.381, that shows the short nap had significant effect on the results of concise memory test score ( $p = 0.002$ ). The result of the logical memory test score ( $p < 0.001$ ) and the total memory test score ( $p < 0.001$ ) agreed with previous research findings<sup>(23)</sup>. The scientist at the Saarland University in Germany supervised the study that concluded a short nap at the office or in school is enough to significantly improve learning success and have found that taking a 45 – 60-minute power nap can boost a persons’ memory five-fold.

## CONCLUSION

Sleep is necessary and rejuvenating for the human body. This finding supports the importance of memory development with a short nap, training students with concise learning to speed up learning. Needs of a short nap for students to achieve academic score and able to observe memorizing method used by students for recall a task. This study concludes that there is a significant association of memory recall test scores between students intervening short nap and student without intervening short nap using concise learning method and logical learning method.

Apart from the institutional changes effective educational interventions it can increase sleep duration and improve sleep habits among students. Now is the time to translate this research into implementation to provide the colleges and universities with sleep-friendly policies and start times based on the best practice for students. Students have to be aware of all the students who sacrifice sleep into their responsibilities. We would like to recommend sleep pod facilities for Universities in Malaysia to encourage implementation on their daily basis to perform well in terms of academic.

**Conflict of Interests:** The authors have declared that no conflict of interest exists.

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**Ethical Clearance:** Ethical approval was obtained from the MSU Ethical Committee.

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# Swimming Skill Development among Rural Children Under Limited Infrastructure: The Stakeholders' Perspectives

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## ABSTRACT

Drowning is one of the most common causes of death among young children in Thailand. Swimming skill and water safety lessons were part of the possible prevention strategies for drowning as they provide children with the required skills and knowledge to keep themselves safe. However, limited study to understand in how children in rural area develop their swimming skill. The qualitative study aims to assess the need of swimming program of primary school students in rural setting of Thailand and explore the opportunity to conduct the program for school children. Group discussion were conducted in three groups of stakeholder; primary school children, teacher, and the community leaders in northern part of Thailand. The field notes were transformed into an organized note for analysis. The findings revealed that school children described their swimming lessons as a life skill which they do not learn in school. Lack of swimming pool, water safety lessons, and instructor were found in school curriculum in primary school level. Majority of children developed their swimming skill in natural water bodies taught by peers, family members. Information gained from school teachers and community leaders indicated their willing to support swimming lessons in the community. Lack of infrastructures in the developing countries is one of the barriers to promote swimming skills among school children in rural setting. The swimming program in the community could be started in collaboration of stakeholders where available infrastructure.

**Keywords:** Drowning prevention, rural, school children, swimming ability

## INTRODUCTION

Drowning is a leading cause of mortality worldwide. An estimated of 372 000 people died each year from drowning, making it the world's third leading unintentional injury killer. Drowning is among the 10 causes of death of children and young people globally. The majority of drowning (97%) occur in low-and middle-income countries (LMIC) and the younger than 15 years are at high risk group<sup>(1)</sup>. Drowning is one of the most common causes of death among young children in Thailand. School-aged children are at high risk of drowning and boys are more than twice as likely as

girls to drown. Similar to LMIC drowning death occur in rural setting, natural water bodies such as ponds, ditched, lakes, rivers or the sea were found to be source of most drowning death<sup>(2)</sup>. This is generally attributed to higher exposure to aquatic environments in rural areas where majority of population lives<sup>(1, 3)</sup>.

Lack of barriers to water bodies, inadequate supervision for infants and young children, and poor swimming skill with less awareness of water danger had been identified as drowning risk in children<sup>(1, 3-5)</sup>. Previous literatures identified that adult supervision, install barriers controlling access to water, provide safe places away from water, teach school-age children swimming with water safety, strengthening public awareness are recommended as community-based action to prevent drowning<sup>(5-8)</sup>. A systematic review addressed that swimming and water safety lessons were part of the possible prevention strategies for drowning as they provide children with the required skills and knowledge to keep themselves safe or remove themselves from

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danger<sup>(7)</sup>. Some of those used have been successfully adapted in LMIC<sup>(9)</sup>. Teaching school-age children basic safety and safe rescue skills is recommended as one strategy to prevent drowning<sup>(1, 4, 5, 7)</sup>.

Brenner et al conducted a case-control population-based study to identify the association of swimming lessons and fatal drowning in children age 1-19 years during 2003-2005 and concluded that participation in formal swimming lessons was associated with an 88% reduction in the risk of drowning in the 1- to 4-year-old children<sup>(10)</sup>. Therefore, basic water safety and swimming skill is highly recommended to prevent child drowning<sup>(3, 4, 7, 11)</sup>. However, in LMIC still need infrastructure and resource to facilitate swimming lessons. Limited resources were found as main barriers to reduce drowning risk in many developing countries. An evidence has been shown in a community survey in rural guardians which indicated limited of the infrastructure to develop swimming skill in school children were found<sup>(12)</sup>.

A cross-sectional study on naturally acquired swimming ability in children in Bangladesh was conducted and identified that they begin natural swim learning in natural water bodies and be able to swim. This research study recommended using existing bodies of water to avoid a major constraint to create the basic infrastructure impossible in many developing countries<sup>(9)</sup>. However, limited study to understand in how children in rural area develop their swimming skill. This paper aimed to address how rural children develop their swimming skill and identify existing community resource to develop their swimming skill.

## METHOD

**Study area:** The study was conducted in rural communities of Chiang Rai province, Thailand. The province is located in the northern most part of Thailand, 820 kilometers from the capital city. Twelve rural communities were selected according to the high drowning incident rate. The selected area has a large pond and many natural rivers which use for agriculture purpose for many generations.

**Study subjects:** Primary children from four rural schools were purposively selected to explore their basic swimming skill and the need of swimming program. Each school, researcher purposively identify (1) students

who could swim and couldn't swim, (2) teachers, and (3) community leaders. For children group, approximately 5-7 subjects involved in discussion. School teachers and community leaders were interview either in schools or at community venue.

**Data collection:** The study was approved by the Ethics Review Committee for Research Involving Human Research Subjects, Chulalongkorn University. Verbal consent was sought from each respondent. The recorded discussions were transcribed fully for data analysis. Group discussion and in-depth interviews ended once the researcher feels that the dialogue had sufficiently covered the topics and no more new information was forthcoming.

**Data Analysis:** Specific issues of discussion were collected from field notes and electronic recordings of discussions. The field notes were transformed into an organized set of notes. Content analysis consisted of reviewing swimming ability, the need for swimming improvement, existing school/community resources and activities to improve swimming ability. The words were coded for participant meaning and feelings and categorized into set themes with meaning associated to the context. Data were then examined and a decision made as to whether conclusions and generalizations were possible.

## RESULTS

The findings were presented in accordance with four themes; swimming skill development, barriers of swimming skill development, existing community infrastructure to facilitate swimming skill for children, and potential role of stakeholders in community swimming program.

**Table 1: Characteristics of the respondents to informal interview**

Group of respondents	Number	Age range (years)
<b>School children</b>		11-15
Boys	28	
Girls	14	
<b>School teachers</b>		48-55
Male	6	
Female	3	

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<b>Community leaders</b>		39-60
Village leaders	3	
Director of local administrative office	1	
Administrative officer	1	
Leader of village health volunteer	1	
Leader of health service officer	1	

**Swimming skill development:** Children described their swimming lessons as a life skill which they do not learn in school. Family members, friends were their swimming instructors. Most of boys were trained in existing natural water bodies such as canals, rivers, dams, fish farms and streams in the community. Girls reported their swimming skill development at a standard swimming pool at private school as an extra-curricular during the summer. They described the difficulty to get to the swimming pool and cost related to their swimming lessons. They perceived that swimming in natural water bodies in the community with friends would be more fun. Children explained ways to learn to swim as follows:

“I learned to swim when I was seven in a river near school, a senior girl in my school taught me. She helped me float in water the first time, and then just let me float. The river near our village was our venue.” (11 year old boy) [S4AS1]

“My brother taught me how to swim at my parents’ fish farm.” (11 year old boy) [S4AS2]

Several reasons were found as a motivation to learn to swim such as do not want to be drown, exercise, for fun. They also believed that swimming makes them healthy and builds strong muscles. Boys expressed their feeling that the decision to learn to swim was their own, for fun, and they were not influenced by any family members. For girls, some stated that they have their own motivation to wanted to learn themselves, while few of reported that it was a need of their parents.

Children had naturally good water safety knowledge in some areas. For example, children generally swam with friends or family for fun, even though they did not realize that this is an important safety issue. *“We usually swim together for fun, and if someone gets in trouble we can help”.* (10 year old boy) [S3AS2]

**Barriers of swimming skill development:** Children who never learn to swim stated that if they had the chance to learn, they would develop their swimming skills. Half had learned swimming with their family members or friends, but had not been able to develop their skills within a few informal lessons.

“We had swimming lessons with a swimming instructor at a private school in the district during our summer time. There were swimming instructors at a pool. Now, we could not go, our parents have to work. There is a high cost and it is inconvenient to swim in the pool.” (12 year old girl) [S1AS1]

School teachers realized that swimming lessons are needed, but most schools do not have a pool. There is not available of clean water where can be a safe place to swim, that’s why almost all of children in their school cannot swim.

“The main reason is that there is no swimming pool for them to learn to swim, another reason is the natural water bodies in our community are too deep then the guardians do not allow the children to swim.” (43 years female school teacher) [S3TF1]

The community leaders stated that now the quality of the natural water has changed; the water is contaminated with some chemical agent from the farm. The children have no swimming venue to play.

“I think that one main cause which can lead to unable to swim children is that their guardians prohibit them from water, they teach the children that water is so dangerous to approach, therefore, the child perceived the danger of water.” (Village leader) [LM3]

**Existing community infrastructure to develop swimming skill and role of partners:** Even though there was lack of infrastructure such as swimming pool or professional swimming instructors in the community. Children believed that clean water such as rivers, ponds and streams can be used as their swimming venue. The instructors could be family members, friends and teachers. Children preferred instructors with good swimming skills and who were able to teach them continually throughout swimming lessons, they believed that it would be best if they were able to learn to swim when they were young.

The community leaders can identify their roles if there are swimming program in the community based on their functions. In addition, health personnel could support the swimming activities by set up the health volunteer team and prepare wound dressing equipment if there are some injured, or referral system if needed.

## DISCUSSIONS

All group of participants agreed that swimming lessons as a life skill which could not find in the school. The school children desired to learn to swim, and some of those who can swim were learnt in natural bodies of water taught by peers. They did not realize that those activities were probably at high risk of drowning if without adult supervision. This was a key reason of higher drowning rate were found in rural setting where available of natural water such as pond, river, lake, etc.<sup>(1, 2)</sup>. Swimming with water safety education is recommended as a basic lifesaving skill to prevent drowning worldwide<sup>(1, 4, 5, 7, 13)</sup>. In addition, a systematic review indicated that intervention programs should emphasis the swimming and water safety education rather than just basic swimming lessons<sup>(13)</sup>. Therefore, improving swimming skill with water safety lessons in rural setting should be considered to be high priority agenda.

Swimming in the natural water could be infected to particular diseases as a consequence. The finding highlighted that inability to swim among rural children was due to lack of infrastructure to facilitate swimming program and water safety lessons. However, children believed that the existing natural water in the community could be their swimming venue. They determined that swimming instructor could be their family members, teachers or friends who can swim which indicated that they accepted available resource. It is possible to conduct a swimming program for children in the community through collaboration of stakeholders within the community with technical support by Thai lifesaving society. There was an example of a successful community-based swimming program in Bangladesh where existing resources were utilized<sup>(9)</sup>. A previous study proved that it was highly cost-effectiveness of swimming intervention in the community<sup>(14)</sup>. The study also recommended implementing in other rural setting where available resource. In addition, the SwimSafe curriculum was developed in collaboration of local partner in Bangladesh, Vietnam, and Thailand and it was realized to be safety

and effectiveness<sup>(1)</sup>. The curriculum could be adopted to improve swimming skill in the rural area.

The community survey in group of guardians in rural Thailand found that they believed the risk and severity of drowning to be high, had favorable attitude towards swimming ability and its benefits of a swimming program<sup>(12)</sup>. Guardians realized that there was no curriculum related to water safety knowledge or swimming lessons for children to learn in the schools. However, they were willing to support facilitate children develop their swimming skills if there is a swimming program exist. Sansiritanaweesook et al conducted a study of surveillance system initiative to prevent drowning in Thailand. This study indicated that through local knowledge and community participation could be the key success to prevent child drowning<sup>(15)</sup>. It was recommended that the key partners to prevent child drowning consisted of four sectors; government agencies, community leaders and volunteers, lay persons, and technical advisory team.

Eventhrough natural water environments are plentiful and are common locations of childhood drowning in Thailand<sup>(2)</sup>. These natural water environments can be used as swimming venue; modification and use of rivers and ponds for swimming lessons has been successful in Australia, Bangladesh, and Vietnam. Swimming programs that are tailored to and run by the local community are important for long term success.

## CONCLUSIONS

Swimming lessons in Thailand are often provided through the schools; unfortunately, this study found that almost school in rural area has no swimming pool. Rural school children do not have the chance to attend formal swimming lessons, putting them at higher drowning risk as a consequence. Lack of infrastructures in the developing countries is one of the barriers to promote swimming skills among school children in rural setting. The findings of this study clearly address rural children in developing countries gain their swimming skill by themselves. The swimming program in the community could be started in collaboration of stakeholders where available resource. Providing the basic swimming skill with water safety education is crucial to reduce drowning mortality as a result of drowning.

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# Personality, Perceived about Co-workers Safety Behavior and Unsafe Acts in Construction Workers

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## ABSTRACT

**Introduction:** The main cause of occupational accidents is unsafe acts. Unsafe acts are influenced by internal and external factors of workers. Internal factors that provide influence to workers' unsafe behavior include personalities and workers' perceived about the actions of co-workers. The purpose of this study was to analyze the influence of extraversion and agreeableness on unsafe acts through workers' perceived concerning the acts of co-workers.

**Method:** The study was observational research with cross sectional design. A questionnaire was administered to building construction worker, and the following results were obtained.

**Results:** First, agreeableness affected worker's unsafe acts through workers' perceived concerning the acts of co-workers. Second, extraversion, agreeableness, and workers' perceived concerning the acts of co-workers directly affected worker's unsafe acts. These findings showed the importance of agreeableness and extraversion as predictors of unsafe acts.

**Conclusions:** By identifying grade of agreeableness, extraversion, and co-workers safety behavior, subcontractor can identify worker's unsafe acts and prevent accidents in building constructions.

**Keywords:** *agreeableness, extraversion, perceived colleagues' safety behavior, unsafe acts*

## INTRODUCTION

Unsafe acts describe risky behavior in work. According to Kaviani (1990), unsafe acts have the same understanding of risky behavior.<sup>1</sup> Lawton (1998) states that risky behavior is an error and violation committed by workers and can lead to work accidents.<sup>2</sup> In addition, unsafe behavior is a form of deviant behavior in the workplace, can easily spread among workers, and cause harm to both the company and the workers themselves.<sup>3,4,5</sup>

Unsafe acts by workers can ultimately lead to workplace accidents. Previous studies have shown that unsafe acts are a major cause of occupational accidents.<sup>6,7-10</sup> Factors affecting unsafe acts include the project management, supervision, contractors, individual factors (attitudes, perceptions, experience, age, use of medication, competence, ability, personality, psychological conditions and competition), working conditions, working groups, organizations, and society.<sup>11,12</sup>

Unsafe actions are influenced by personal factors of the worker, including the worker's personality. Researches regarding the influence of personality on unsafe acts are still difficult to obtain. However, researches that illustrate the influence of personality on work accidents are sufficient in number such as Cellar et al, Clarke & Robertson, Postlethwaite et al, Rahimi-pordanjani et al.<sup>13,14-17</sup> Nevertheless, the relationship between Big Five personality dimensions and workplace safety is not fully understood, and Clarke & Robertson suggest that it may be useful to consider variables moderate personality safety relationship.<sup>15,16</sup>

Trait-based personality theory suggests that action is predicted by understanding the three core components namely basic tendencies (extraversion, agreeableness, conscientiousness, neuroticism, and openness), adaptation characteristics (attitudes, beliefs, and feelings), and self-concept (knowledge, views and self-evaluation). In addition, there are secondary components consisting of biological basis (genes, hormones, and brain structure), objective biographies (emphasizing what

happens in one’s life), as well as external influences.<sup>18</sup> In summary according to McCrae and Costa, personality provides influence on one’s actions.

The Health Belief Model explains that personality is one of the socio-psychological variables that will affect person’s perceived trends about certain symptoms, threats, and benefits of taking precautions against the onset of symptoms.<sup>19</sup> Narwoko and Suyanto defines personality as personal psychological tendency to engage in certain social behaviors whether they are closed behaviors (feelings, intentions, thoughts, attitudes) or open behaviors (daily actions).<sup>20</sup> In other words, this definition explains that personality provide influence on person’s perceived regarding a particular thing. Jiang et al and Dejoy et al specifically explain that there is an influence of workers’ perceived regarding the actions of co-workers on the acts of the worker.<sup>21,22</sup> Therefore, based on the existing theory and previous studies, this study was conducted with aim to analyze the influence of extraversion and agreeableness to unsafe acts through workers’ perceived regarding the actions of co-workers.

**METHOD**

In this cross sectional study, the study population consisted of all worker in the construction project of a new Provincial Governor Office of NTT, Indonesia, during 2016 (N= 350). After we analyze data normality, outlier multivariate, and multicollinearity, we get 185 respondents that can be used in analyzeof hypothesis. This research used personality questionnaire from International Item Pool Representation (IPIP-NEO) that

developed by Goldberg.<sup>23</sup> Data analyze in this research used Structural Equation Modell (SEM) with Amos.

**RESULT**

To assess the constructs, confirmatory factor analysis was conducted to analyze the validity and reliability of the constructs. There were 4 constructs and 23 indicators in this study. Convergent validity was verified by standardized factors loadings (FL>0.4) and construct reliability (CR> 0.7).<sup>24</sup> Factor credibility was verified, loading factor and construct reliability for all indicators were confirmed above 0.4 and 0.7 (Table 1).

Various fit indexes were used to examine the structural models, including the following: Chi-square( $X^2$ ;p<0.05), Chi- square/degrees of freedom( $X^2/df$ ; <3.00), goodness of fit index (GFI >0.9), adjusted goodness of fit index(AGFI> 0.9), normed fit index(NFI> 0.8), comparative fit index(CFI> 0.9), root mean residual (RMR<0.1), and root mean square error of approximation (RMSEA<0.05) verified measurement model validity.<sup>25,26</sup>

The result of SEM were  $X^2 = 148.196$  ( $p < .001$ ),  $X^2/df = 1.512$ , GFI = 0.914, AGFI = 0.881, NFI = 0.829, CFI = 0.933, RMR = 0.026, and RMSEA = 0.051. This process satisfied conformity and the hypotheses were tested (Table 2). Agreeableness affected worker’s unsafe acts through workers’ perceived concerning the acts of co-workers. But extraversion did not affect worker’s perceived colleagues’ safety behavior. Extraversion, agreeableness, and workers’ perceived concerning the acts of co-workers directly affected worker’s unsafe acts.

**Table 1: Confirmatory Factor Analysis**

Construct	Indicator	Loading Factor	Critical Ratio	p	Construct reliability
Extraversion	Indicator 1	.571	6.625	.000	.887
	Indicator 2	.429	5.043	.000	
	Indicator 3	.493	5.695	.000	
	Indicator 4	.618	6.912	.000	
	Indicator 5	.718			
	Indicator 6	.620	7.290	.000	
Agreeableness	Indicator 1	.428	4.688	.000	.877
	Indicator 2	.675			
	Indicator 3	.452	5.237	.000	
	Indicator 4	.401	4.372	.000	
	Indicator 5	.594	6.657	.000	
	Indicator 6	.508	5.517	.000	

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Workers' perceived concerning the acts of co-workers	Indicator 1	.644	7.021	.000	.862
	Indicator 2	.661			
	Indicator 3	.695	7.532	.000	
	Indicator 4	.650	6.882	.000	
	Indicator 5	.463	5.220	.000	
Unsafe action	Indicator 1	.477	5.871	.000	.891
	Indicator 2	.503	6.264	.000	
	Indicator 3	.489	6.173	.000	
	Indicator 4	.725			
	Indicator 5	.653	8.135	.000	
	Indicator 6	.781	9.588	.000	

**Table 2: Hypothesis testing results**

Hypothesis	Estimate	C.R.	p	Hypothesis testing results
H1. Extraversion → Workers' perceived concerning the acts of co-workers	.108	1.141	.254	Rejection
H2. Agreeableness → Workers' perceived concerning the acts of co-workers	.269	2.690	.007	Adoption
H3. Extraversion → Unsafe action	-.541	-5.656	.000	Adoption
H4. Agreeableness → Unsafe action	-.481	-4.486	.000	Adoption
H5. Workers' perceived concerning the acts of co-workers → Unsafe action	-.295	-3.457	.000	Adoption

## DISCUSSION

The higher the value of agreeableness of respondent the better respondents' perceived to the actions of their co-workers. The better the worker's perceived regarding the actions of co-workers, the less unsafe acts performed by the worker. In this study the influence of co-workers was measured by workers' perceived regarding the actions of their co-workers. Respondents were asked to measure their feeling regarding the influence of co-workers for themselves in acting safely, for instance when co-workers utilize Personal Protective Equipment, would respondents feel the need to also utilize and act to use the same thing. The results of this study confirm the results of previous studies conducted by Cellar et al and Sing et al.<sup>13,27</sup>

Workers' perceived are not solely influenced by what is done by the management, formal rules applied, and work procedures that exist, but also influenced by co-workers in the same division.<sup>28</sup> Coworkers could bring influence on a worker in many ways, including acting safely at work. The results of previous studies prove that

high agreeableness in general reflects good perception on a person. An agreeable person does not like to provide negative responses especially in the workplace.<sup>29</sup>

According to Friedman, people who have high dimensions of agreeableness tend to be friendly, cooperative, believing, and warm.<sup>30</sup> This trait which also being called adaptability indicates friendliness, easy to budge, avoiding conflict, and tend to follows. In addition, a person with high agreeableness is helpful, forgiving, and merciful. Conversely, a person with low agreeableness has flat, competitive, selfish, confrontational, and unfriendly characters.

Unsafe action decreases with increasing extraversion value. Individuals with high extraversion dimension tend to be passionate, enthusiastic, dominant, friendly, and communicative. They also remember all social interactions, interact with more people, and take control in relationships and peer groups. In addition, extraversion described as ambitious, hard-working, and getting friendship faster, easy to motivate, easy to challenge, and easy to being bored.<sup>30</sup> When the respondent performs

safe action at work and has dominantly extraversion, the respondent will be the one who provide influence to his/ her co-workers in acting safely, because person with high extraversion value is a dominant person and is holding control of relationship in one group.

Co-workers are one of the supporting factors for workers to acting safely. When co-workers do safe action at work, other workers in the same work group will do the same, even more when the co-workers are senior workers in their group.<sup>31</sup> In addition, Liao explained that communication in group and cognitive from workers are related to unsafe acts on construction work.

The study indicated that workers' perceived regarding the actions of co-workers provided influence on unsafe acts of the workers. This was in line with study conducted by Jiang et al that discovered a new concept of Perceived Co-workers Safety Knowledge/ Behavior (PCSK/B).<sup>21</sup> The concept explains that safe acts in work are influenced by perceptions about beliefs of safety of co-workers and peers behavior. This is due to the habits of Asian people who easy to follow something viewed (contextual factors) than to comply with existing rules.<sup>32</sup> This condition resulted in construction workers being easier to see the actions of their co-workers than to remember existing work rules.

## CONCLUSION

Our research shows that agreeableness affected worker's unsafe actsthroughworkers' perceived concerning the acts of co-workers. Additionally, extraversion, agreeableness, and workers' perceived concerning the acts of co-workers directly affected worker's unsafe acts. By identifying grade of agreeableness, extraversion, and co-workers safety behavior, subcontractor can identify worker's unsafe acts and prevent accidents in building constructions.

**Ethical Clearance:** This study was taken from the Faculty of Public Health Research Ethics Committee, Faculty of Public Health, University of Airlangga.

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**Conflict of Interest:** There is no conflict of interest in this study.

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# Determinant Factors of Work Stress among Teaching and Non Teaching Staff in Indonesia

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## ABSTRACT

**Background:** Work stress could be experienced every worker including teaching and non-teaching staff in the university. The main objective of the present research was to analysis influence intrinsic factors and extrinsic factors to work stress among teaching and non-teaching staff in the one of faculty in the university, Indonesia. Intrinsic factors were age, gender, educational level, marital status, residence status, work motivation and occupational fatigue. The extrinsic factor was workload, work hours and role in the organization.

**Material and Method:** This study was analytic research with a crosssectional design. In this study (N =81), about 75% teaching staff experienced work stress in moderate level and about 71,11% non-teaching staff also experienced work stress in moderate level.

**Result:** Work motivation, occupational fatigue and role in the organization were significantly affect to work stress. There was no significant affect on age, gender, educational level, marital status, residence status, work hours to work stress.

**Conclusion:** Role in the organization (role ambiguity, role conflict and responsibility to whom) should be fixed clearly and university should be given more reward and recognition to teaching and non-teaching staff.

**Keywords:** *Determinant, Factors, Work Stress, University*

## INTRODUCTION

Work stress could be experienced every worker including teaching and non-teaching staff in the university. Factors that affect job stress include too heavy workload, lack of rest time, long working hours, shift work, monotonous work, too easy work, no authority, management (less involving workers in decision making, poor organizational communication, etc.), interpersonal relationships, unclear job roles, unclear careers and work environments. The workload referred to above is the workload both physically and mentally. The work environment in question is one of the lighting factors<sup>1,2,3,4</sup>.

In Indonesia, data on occupational stress are derived from various research and basic health research. In 2013 basic health research results found that about 6% of the population with age above 15 years showed a mental disorder (Kemenkes RI, 2013). The prevalence of work

stress in PNS Ministry of Health is 79%. This figure is quite large when compared with other studies<sup>5</sup>. The data above one of the sectors that the ratio was quite high in the education sector. It was due to the high and rapid development of education in the world including in Indonesia. In addition, with the competition between universities could not be denied again to be one cause of the rapid development of universities.

Fast development, tight competition, and quality improvement of the university became one of the causes of stressful work for the civitas academica namely lecturer (teaching staff) and Educational personnel (non-teaching staff). Lecturers and education personnel must ultimately strive to meet the performance targets of faculty or existing work units. That research which states that the stress on academic staff to be a problem in the world. The academic environment does not always lead to low work stress. Academic staff also experience increased work stress with the rapid development of education<sup>6</sup>.

A professor or lecturer at the college is one of the spearheads in achievement university performance targets. The performance targets set by the university such as the achievement of competency through learning activities, development of science through research and publications and training and their social responsibility linear with research through community service activities. In this study, we aimed to analysis determinant factors of work stress among teaching and non-teaching staff in Indonesia.

## MATERIAL AND METHOD

This study was analytic research with crosssectional design. Analysis data using multiple linear regression for examining affect intrinsic factors and extrinsic factor to work stress The population of this research was about 77 people of teaching staff and 90 people of non-teaching staff in one of faculty in Indonesia. The sample size was calculated by simple random samling formula ( $N = 81$ ). The research instrument used in this study were questionnaires. Measurement of work motivation is measured using the scale on 5 points scale ranging from 1 =strongly disagree to 5- strongly agree. Measurement of subjective occupational fatigue used Subjective Self Rating Test from the Industrial Fatigue Research Committee (IFRC). Measurement of workload used NASA-TLX method (National Aeronautics & Space Administration Task Load Index).

In this study, data retrieval was done 3 times. In the first stage, the data taken were the individual data of respondents such as age, gender, hours of work, length of service, marital status, residence status and work motivation. The second stage of data taken were data on subjective occupational fatigue and roles in the organization (ambiguous roles, the role of conflict and responsibility to whom). The third stage of data taken were data on subjective workload and work stress data.

## FINDINGS

Every worker has experienced work stress, excluding teaching and non-teaching staff in the university. In this research, most of teaching and non-teaching staff experienced medium-level work stress (table 1). Medium level stress could be a high level of work stress even very high if not managed properly.

Lecturers also often experience stressful conditions such as poor time management, doing administrative tasks such as making the draft of letters and attending meetings (while teaching staff as a lead in management position such as the head of department and head of study program). Almost teaching staff have repetitive disorders during working on their main job. Teaching staff often interrupted by student guidance appointments, guests, telephones etc. On the other hand, teaching staff also has a lack appreciation compared with the double burden they had.

While the non-teaching staff, especially in the academic and finance who experience a heavy workload because it must serve students and teaching staff of 18 units of work in the faculty. Non-teaching staff compared with the ratio of the number of students clearly not comparable. However, increasing the number of staff is also not necessarily solve the problem. Non-teaching staff (administration in the study program, academic, finance and laboratory staff and other supporting) is an important element in a system that exists in the university other than lecturer that is not the same as lecturers. The increasing workload, especially those that are not related to the main tasks in the work unit, can cause work stress.

With the additional burden given by universities in Nigeria, many staff could not leave or vacation in the last decade. Given this, it turns out that productivity is declining even though there are already additional benefits. In addition, there was a tendency of depersonalization of educational personnel with the male. The tendency for this depersonalization is when an educator behaves negatively like a cynical client. The clients referred to here are students and lecturers<sup>7</sup>.

Job stress has a negative effect on the performance of educational personnel. Individual stress does not have a positive effect on efficiency and work effectiveness for educational personnel. The existence of individual stress reduction proved positive for moral improvement and behavior for educational personnel<sup>8</sup>.

In this study, intrinsic factors such as age, sex, gender, education level, marital status and residence ownership status did not significantly influence the onset of work stress ( $\alpha > 0.05$ ). While the motivation of work and fatigue work of teaching staff and non-teaching staff have an effect on the happening of work stress and subjective fatigue . Extrinsic factors did not affect the occurrence of work stress were work hours

and workload. The role of the organization influences the emergence of work stress among teaching and non-teaching staff (table 2).

A study on work stress on nurses also mentions that there is no significant influence between age, sex, workload of physical work with work stress. On the contrary, mental workload was the dominant factor of work stress.<sup>9</sup> As nurses, teaching and non-teaching staff are more dominant to get a mental workload than the physical workload.

Motivation can arise because of 2 factors. Factors that make workers feel calm, happy and comfortable as comfortable working conditions, workloads in accordance with capacity, individual growth, and so-called satisfiers. Further factors called dissatisfaction include company policy, relationships or interpersonal, personal life and salary. Sufficient compensation for everyday life then a counselor will be motivated well so that will do a higher job<sup>3</sup>.

The existence of an imbalance between high performance and low appreciation occurs in conditions when workers have limited choices in the workplace such as low skills, lack of movement and forced labor. In addition, workers think that they will gain improvement in the future (related to career and position). Means that when they work in an organization, they will get something that suits their business. Excessive commitment to the organization and low income, rewards, and promotions contribute to stressful work<sup>10</sup>.

As many as 55,56% of teaching and 42,22% of non-teaching staff who experienced subjective fatigue were causing moderate work stress as well. It turns out in educational personnel, low work fatigue can also cause a moderate level of work stress. Fatigue of work on teaching and non-teaching staff affect the occurrence of work stress (table 2). The subjective fatigue that occurs is due to the high workload among teaching and non-teaching staff. This workload relates to the duties and responsibilities of teaching and non-teaching staff.

Excessive workloads of both physical and mental workloads can lead to work fatigue. Excessive work fatigue and accumulate can cause stress. Work fatigue is an accumulation of various reactions such as a headache, muscle pain, anxiety, frustration and so on. According to the combined theory of the effects of causes of fatigue and refreshment, fatigue is caused by various factors.

Intensity and duration of work, mental environment, work environment (including climate, lighting and noise), circadian rhythms, physical problems and responsibilities, health and nutrition conditions<sup>11,12</sup>.

Lecturers have a great responsibility and important role in the university. Lecturers also have moral and intellectual responsibilities. Responsibility was in the form of renewal of knowledge, technology, and information that will become a teaching material to students. Some lecturers or faculty. The many demands can ultimately lead to depression or work-related stress. The existence of work stress and strong commitment are significantly related to the incidence of depression in lecturers or teaching staff in China<sup>13</sup>.

In addition, data from a nationwide survey of lecturers present at 17 Australian universities indicate that the presence of mental stress and its impact on job satisfaction lies with nearly 9,000 study subjects. It turns out to be related to welfare (salary, investment, lecturer-student ratio and so on)<sup>14</sup>. Approximately 75% of teaching staff experience work stress<sup>15</sup>.

Roles in the organization of lecturers and educational personnel in this organization is divided into 3 categories namely the role of ambiguity, role conflict and responsibility to whom (superior in the organization). The role of ambiguity and role conflict are two forms of role stress experienced by a worker. But because the role in the organization is low then this variable can contribute low to the occurrence of work stress.

The role of ambiguity or unclear tasks and role conflict in an organization was potentially causing work stress. It is in a study in Pakistan that there is a connection between ambiguous roles, role conflict, job satisfaction stress and organizational commitment. Especially in the role of ambiguous and role conflict, there was a positive relationship with the stress of work experienced by the lecturer. As for satisfaction and organizational commitment showed a negative relationship with work stress. So it is found that there is an ambiguous role and role conflict in lecturers and become one of the causes of work stress<sup>16</sup>.

Many other studies have suggested that ambiguous roles and role conflicts are positively associated with work stress. Another study that supports the results of research in managers in Pakistan which states that



significantly there is a difference in job stress between high ambiguity role with low ambiguity role. In addition, work stress also differed significantly between groups of managers with high role conflict and group managers with low role conflict<sup>17</sup>.

The ambiguous role or double burden that is burdened or experienced by the teaching staff when the teaching staff has to implement their main job (it is called tri dharma) i.e. teaching, research and community service. However, at the same time, they also have to perform administrative tasks such as quality assurance, database data collection, curriculum compilation and other additional tasks beyond the tri dharma as the main job.

**Table 1: Description of Work Stress among Teaching and Non-Teaching Staff**

Level Stress	Teaching Staff (%)	Non Teaching Staff (%)
Low	8,33	13,33
Medium	75,00	71,11
High	13,89	15,56
Very High	2,78	-
<b>Total</b>	<b>100,00</b>	<b>100,00</b>

**Table 2 Intrinsic and Extrinsic Factors on Teaching and Non Teaching Staff and Work Stress**

Factors	Teaching Staff (%)	Non Teaching Staff (%)	$\alpha$
<b>Age</b>			
20-30 years old	50,00	35,55	0,555
31-40 years old	11,11	15,56	
41-50 years old	38,89	48,89	
Total	100,00	100,00	
<b>Gender</b>			
Male	27,00	64,00	0,760
Female	73,00	36,00	
Total	100,00	100,00	
<b>Educational Level</b>			
High school	-	11,11	0,709
Diplome	-	4,44	
Bachelor	-	68,89	
Master	91,67	15,57	
Doctoral	8,33	-	
Total	100,00	100,00	

Conted...

<b>Marital Status</b>			
Married	88,89	77,78	0,868
Unmarried	11,11	22,22	
Total	100,00	100,00	
<b>Residence Status</b>			
Owner	58,33	55,56	0,328
Along to parents	22,22	33,33	
Along to the others family members	8,33	11,11	
Rent a house	11,11	-	
Total	100,00	100,00	
<b>Work Motivation</b>			
Weak	-	-	0,003
Medium	44,44	31,11	
Strong	55,56	68,89	
Total	100,00	100,00	
<b>Work Fatigue</b>			
Low	41,67	57,78	0,025
Medium	55,56	42,22	
High	2,78	-	
Total	100,00	100,00	
<b>Workload</b>			
Very low	-	-	0,633
Low	-	-	
Medium	5,56	22,22	
High	72,22	62,96	
Very High	22,22	18,52	
Total	100,00	100,00	
<b>Work Hours</b>			
< 8 hours per day	13,39	-	0,137
8-10 hours per day	86,11	91,11	
>10 hours per day	-	8,89	
Total	100,00	100,00	
<b>Role in Organization</b>			
Very low	22,22	22,22	0,010
Low	47,20	51,11	
Medium	30,50	24,44	
High	-	2,22	
Very High	-	-	
Total	100,00	100,00	

## CONCLUSION

Extra burden and high work motivation that was not accompanied by high appreciation from the institution or university can trigger the occurrence of work stress on teaching staff. While the non-teaching staff, the role of ambiguity and responsibility to the “head who” and the additional burden that can trigger the occurrence of stress work. The management of the university needs to conduct an overall job stress assessment in each work unit to map out the main causes of work stress and to exercise control such as rewarding and detailed job description mapping. This is done to decrease job stress and productivity of teaching and non-teaching staff can increase.

**Ethical Clearance:** Ethical clearance was taken from Health Research Ethics Committee, Faculty of Public Health Universitas Airlangga

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**Conflict of Interest:** There was no conflict of interest during the submission until the review of the manuscript process.

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# Measurement of Radon Concentration in the Soil of Some Areas of the City of Shatrah Using the Nuclear Impact Detector (Cr-39)

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## ABSTRACT

In this study, (CR-39) was used to detect the effects of charge particles of protons, alpha particles and fission fragments. Rn<sup>222</sup> is an environmental contaminant that causes serious health problems because it is considered One of the main outputs of uranium fission. The samples were collected at a depth of (5.15.25.35.45) cm and the highest value was recorded in the industrial area of (1666.911 ± 27.21531) Bq/m<sup>3</sup> and the lowest value in Al-Hurriya district where (988.99 21.9631) Bq/m<sup>3</sup> was recorded. The general average was (1375.7876 Bq/m<sup>3</sup>) These values are higher than the natural exposure limit set by the World Health Organization of (800 Bq/m<sup>3</sup>) (WHO), which leads to contamination of all areas of the study.

**Keywords:** Radon Rn<sup>222</sup>, Reagents Solid nuclear impact, Radiation activity.

## INTRODUCTION

Radon Rn<sup>222</sup> is a poisonous gas released from the uranium-containing soil. It is colorless, tasteless and odorless and is seven and a half times heavier than the air. It is radiant and half-life (3.82) days long. Its nuclei are emitted by the emission of alpha-nuclei produced by Polonium Po<sup>218</sup>.

The radon is able to move from one place to another without any obstruction, which causes the process of exposure and radiation occur very high probability of a large number of people and studies have proved that porosity low soil granules are close to each other When the radon atom from the granule, the energy of rebound buried in another granule and thus can escape When the distance between the granules is large, the probability of stopping the radon atoms in the large pores and spreading to the surface is easily confirmed by the United Nations report (UNSCEAR, 1983) on the sources of natural radiation. Radon represents more than 50% of the total exposure to human N Radiation dose resulting from natural Radon radiation<sup>1</sup>.

Radioactivity is defined as radioactive radiation<sup>2</sup>. Natural radiation can be arranged as a cosmic or terrestrial radiation and the dose rates vary greatly between them because of their dependence on the places where the measurements were made, as well as the rise

from sea level and the concentration of radioisotopes in the earth is one of the main causes of these differences. All living organisms are exposed to a certain amount of Natural radiation in the form of particles and radiation. In addition to sunlight, all living organisms suffer from cosmic rays coming from space and also suffer from natural background radiation, especially half normal life (4.49 x 10<sup>9</sup> years). U238 (99.29%) uranium U235 (0.17%) is a series of anomalies that emit alpha particles, beta particles and gamma rays until they reach the stable lead element<sup>3</sup> as in Figure 1<sup>4</sup>. The technique used to determine the concentration of radioactive materials is an important technique in determining the concentration of radioactive materials because of their availability and accuracy. Impact detectors are defined as electrically insulating materials ranging from special resistance (106-1020 ohms) to narrow paths of radiation damage called stable effects when charged particles pass through.<sup>5</sup> Nuclear reagents are divided into two main sections: inorganic reagents and organic reagents. Do not enter inorganic reagents in carbon and hydrogen. Their atoms are linked to ionic bonds, including mica and glass detectors, which are used to record the effects of neutrons, especially in nuclear reactors, and are characterized by their susceptibility to fission fragments. Reagents in chemical scattering with HF solution at (48%) and temperature (20-25 C)<sup>6,7</sup>. As for organic reagents, hydrocarbons enter their components, which

are more sensitive to ions than inorganic reagents, because they are sensitive to all ions. Are large molecules consisting of small, repetitive and interrelated units called polymers. Monomers in most plastics consist of atoms linked together by a covalent bond dominated by hydrogen carbonate (HC) that can be easily broken when exposed to radiation.<sup>8</sup> Because uranium minerals emit uranium gas with radon gas more dangerous than other hard rock mining, adequate ventilation systems are required if the mines are not an open pit.<sup>9</sup> It has been shown that radon, produced by uranium, not uranium itself, is a carcinogen.<sup>10</sup>

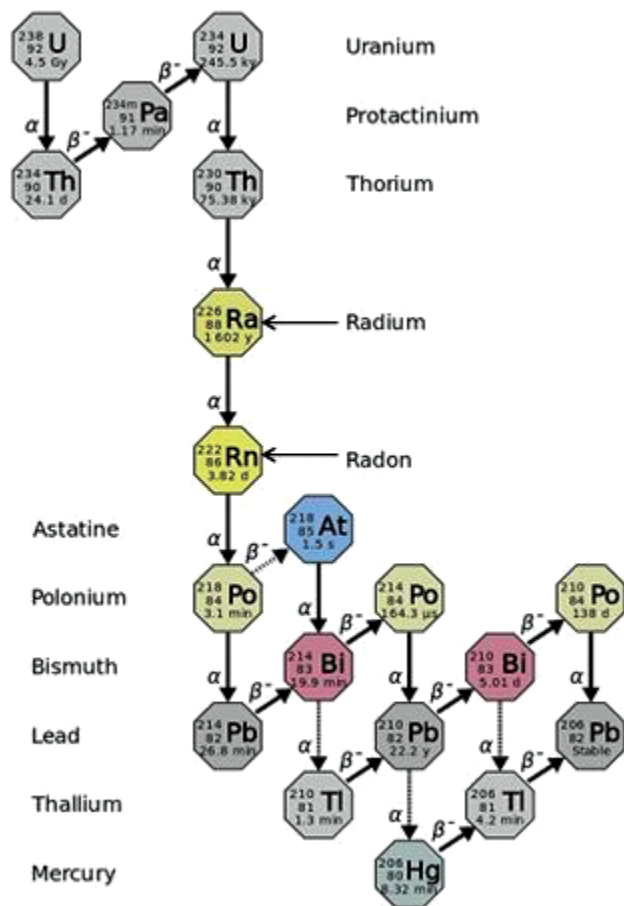


Fig. 1: The radium or Uranium series<sup>4</sup>

**Research goal:** The study aims at measuring the radiation background spectra, as it acquires an important aspect of environmental protection studies from pollution, monitoring of natural radiation activity and exploring the possibility of radioactive materials.

**The theoretical part**

**1. Radon concentration calculation:** Solid-state detectors are used. This method is more efficient in measuring radon concentrations. The detector

(CR-39) was used. A detector is placed in the closed distribution chambers in cylindrical or semi-conical form. For the sample to measure radon concentration and close it tightly to prevent leakage or exchange of air with the ocean and after spreading inside the room, the best distance to the radiant system is when the distance between the threshold surface and the detector is greater than 7cm<sup>8</sup>. Radon and Th234 resemble the same element (belonging to two different melting chains). And can be separated only on the basis of significant difference in decomposition rates. Through the effects that particles form from the alpha emitted because radon diameters are greater than the effects of Th234.2. The mechanism of the effects on the surface of the detector

Particles in solids generated a number of effects during the passage of those substances and can be observed using electronic microscopy or light after treatment with a chemical to show the areas of damage formed. The shape and type of damage zones depend on the mass, energy, charge of the fallen particles and the type of solid material<sup>9</sup>. The theory of ion explosion is the mechanism that can explain how the effect of polymers is formed. Large, repetitive and interrelated molecules, called monomers and others, are linked to each other in most plastics by a hydrogen-carbon-bonded hydrogen bond when exposed to radiation, resulting in small polymer chains with effective ends Free Ionic radicals are called, who have the ability to interact with each other or with other atoms<sup>10</sup>. The fall of radiation on these polymers to the irritation and ionization of these molecules and thus the separation of links between them and the damage of polymer and Lysol under normal circumstances and knowledge of the influence of this inventor<sup>11</sup>. Areas affected by ionizing radiation show greater ability to interact with alkaline solutions such as sodium hydroxide compared to health zones because the affected areas have more energy, so the chemical solution quickly penetrates the radioactive regions, causing an increase in depth and tracking of the diameter with increased skimming time. See the inherent effect of ionizing radiation after being introduced under a microscope.<sup>12</sup>

**3. Fixed propagation calculation:** The measurement of radon concentration is based on the determination of the propagation constant (K) which can be determined for the propagation chamber used in this study of relationships <sup>13</sup>.

$$P = KCT \quad \dots(1)$$

$$D = P/T = K.C \quad \dots(2)$$

Dependence on dimensions K It is also possible to find a constant propagation of geometry for the diffusion chamber as in the relationship:

$$K = 1/4 r(2\cos \Theta_c - r/R_\alpha) \quad \dots(3)$$

Where r: the current diameter of the tube is 1.19 cm and  $\Theta_c$  is the critical angle of the detector CR-39, 35°, and  $R_\alpha$  The range of alpha particles in the air emitted from Rn<sup>222</sup> and the value of 4.15 cm appears in equation <sup>10</sup>.

$$R_\alpha = (0.005 E_\alpha + 0.285) E_\alpha^{3/2} \quad \dots(4)$$

$E_\alpha$  represents the energy of alpha particles in Mev units whose value (K) depends on the geometry of the irradiation chamber. Therefore, when k is calculated from equation (3), its propagation constant value of length units is  $K = 0.402 \text{ cm}$ .

4-Calculation of radon concentration in samples: Radon concentration can be determined

$$C_x = \lambda R_n C_\alpha \text{ ht/L} \quad \dots(5)$$

**Practical Part:**

**1. Phase of collection and preparation of samples:**

During July 2018, samples were collected for five different areas of the city of Shatrah in Dhi Qar Governorate (Al-Sansi neighborhood, Al-Hussein neighborhood, the followers). Baghdad district, al-Hurriya neighborhood, (5.15.25.35.45 cm) for each area. Samples are sampled to obtain a homogeneous and smooth model ready for examination and analysis.

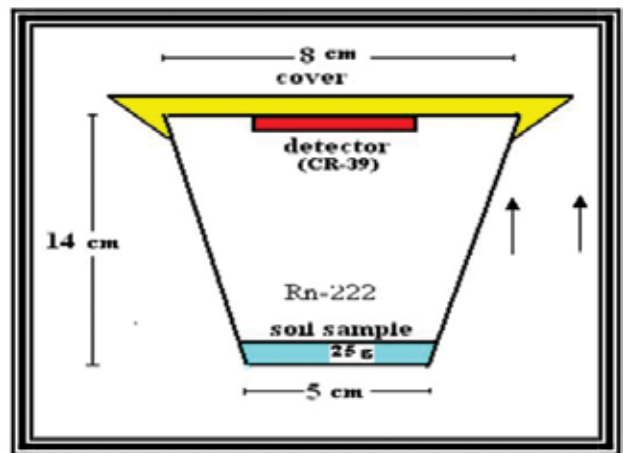
**2. Measurement method:**

The long-term radiation sensing technique was selected to obtain the effects of the alpha particles emitted from the radon gas from the samples under study. The CR-39 with the thickness of (100 μm) was used with an equal dimension of (1 × 1 cm<sup>2</sup>). (12 gm) of each sample. The amount to be studied was determined by a sensitivity scale of (0.5 × 10<sup>-2</sup>). The samples were placed in conical irradiation chambers, which are called diffusion chambers and were in diameter (8.5 cm x 5 cm) And the provisions of the closure by rubber payment while

keeping the distance between the surface of the sample and the surface of the bottom payment containing the detector piece <sup>15</sup>. Each sample is then given a period (22 days) to obtain an ideal balance of (98%) between radium and its radon counterparts. Without the radon leaking out of the compartments, the charge was quickly removed and replaced with another charge with a bottom piece on the detector. The reagents remain in the irradiation chamber for 60 days after the reagents are removed and prepared for chemical scaling using NaoH solution with purity (98%). This process shows the intensity of the effects of radon on the detector. The temperature associated with this process was (70 ° C). Concentrate solution (6.25 N), (25gm) of NaoH in 100 ml of distilled water to take into account the low water level in the evaporation of the bottle due to the high temperature resulting from the melting process with the addition of water to the bottle after the thermal balance with the ocean and calculate the standard equation:

$$W (g) = N \times V \times W_{eq} \quad \dots(6)$$

For a skimming process in a water bath, heat to (60C) and attach the detector to the inside of the skimming solution for (17 hours) at a rate of (3-4 hours) per day by washing the detector after each time with normal water and then with distilled water and drying <sup>15</sup>. Visual microscopy, detection and calculation of the number of effects arising from the interaction between the alpha particles emitted from the radon and the front of the detector. By calculating the radiation background by placing a detector in the sealing cylinder and free of samples at the same time as the reagents used for the samples under study. As in Figure (2.3).



**Figure 2: Illustrates the chemical scattering process of the nuclear impact detector (CR-39)**



**Figure 3: shows the effects of the radon-free alpha particles in the impact detector (CR-39)**

**RESULTS AND DISCUSSION**

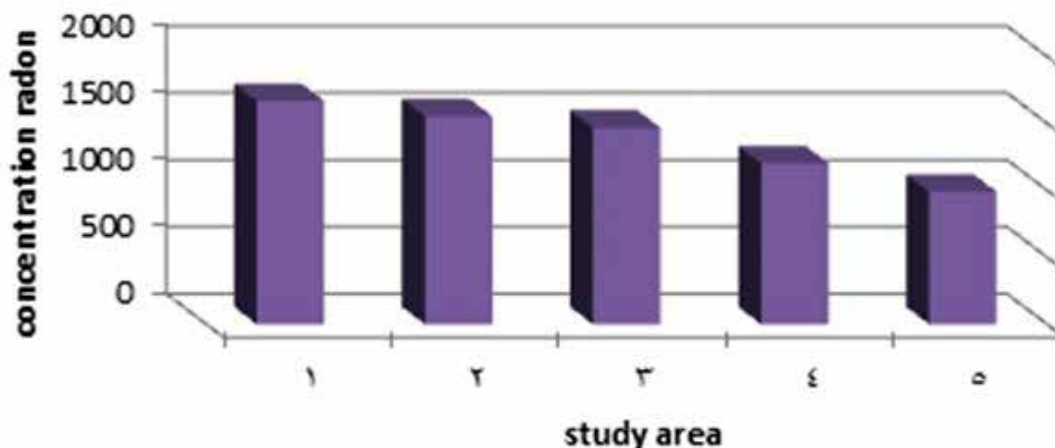
Table (1) shows the effect of alpha particles and radon concentration in samples. Was the highest value in the industrial area where it was recorded (27.21531 1666.911)

Bq/m<sup>3</sup> and recorded the lowest rate in the freedom zone (988.99 21.9631) Bq/m<sup>3</sup> higher than the natural exposure limit set by the World Health Organization (800) Bq/m<sup>3</sup> <sup>16</sup> Radon is the production of natural gas to analyze uranium and soil is the source of most building materials are contained in a certain amount of uranium, thorium and radium emitted by radium, and more radiant than gypsum and calcite, which is saturated with grass, flint, and stones. Fluorescent. The lack of ventilation exacerbates things because they lead to the collection of gases in indoor because the concentration of radon produced in the air varies with the ventilation rate <sup>15</sup>. The results indicate that the radon concentration increased during the Gulf War (1991-2003), resulting in the city being polluted by depleted uranium and its degraded products. Radon is present in the earth's atmosphere <sup>17</sup> and (10%) of radon leakage from cracks and rock cracks and through soil pores to reach the surface of the soil. <sup>18</sup> As in figure (4) Table (2). Comparison of current radon concentration and previous local studies

**Table 1: Concentration of radon gas in the soil models under dorsal**

**Table (1) Concentration of radon gas in the soil models under dorsal**

The name of the area	The intensity of the effect ± standard deviation (Track / mm <sup>2</sup> )	Concentration ± error ratio Bq / m <sup>3</sup>
(1)Industrial neighborhood	197931.03±1598.9	1666.911±27.21531
(2)Doctors' District	91293.1 ± 1052.28	1553.925 ± 17.91131
(3)Baghdad district	86206.9±1442.517	1467.351±24.55349
(4)Al - Husayn District	70603.45 ± 1246.279	1201.761 ± 21.21325
(5)Al-Ameen district	58103.45 ± 1290.227	988.99 ± 21.96131
The rate	1375.7876 ±22.57094	



**Figure 4: Radon concentration in the study area samples**



**Table 2: Previous local studies to measure radon concentration**

NO	Soil source	Concentration of radon Bq / m <sup>3</sup>	Researcher and Year
1	Iraq (Central and Northern Region)	33-100	Dunia(2000)[22]
2	Baghdad-Al-Wardia	697.18	Karim(2004)[23]
	Riyadh district	163.45	
	Tuwaittha	119.17	
3	Taji	229.27-665.56	AL-Baidhani(2006)[19]
	Karbala	229.27-478.94	
	Sight (public)	388.96-607.21	
4	Sulaymaniyah	22.3	Muhammad(2008)[20]
	Erbil	26.17	
5	Karma Bani Saeed	1146.227	H.R Mahasr.(2009)[19]
	Darwishi Station	18329.47	
6	Kut	583.594	Jabbar (2011)[18]
7	Nasiriyah	1386.236	Kadhim (2014)[23]
8	Shatrah	1375.7876	The current study(2018)
	The limit	800	WHO(1993)[16]

Table (2) shows the high concentration of radon in our current study of the records of Jabbar (2011) and the inventory (2009) and the record of AL-Baidhani (2006), Muhammad (2008) and Karim (2004) While the concentration of gas is less than that recorded by a buffer in the south of Iraq - the station Aldroishi and approach to the record KADHIM (2014). The highest concentration of radon gas, mainly in the city of Shatra to missile bombing during the second Gulf War (2003) Radon is the main baby of the products of decomposition Uranium and thorium, in addition to the resulting radiological activity within the buildings resulting from building materials, contains a quantity Data from the natural radioactive elements such as ( $K^{40}$ ,  $Ra^{226}$ ,  $U^{238}$ ), especially when there are cracks in the building foundation and soil.

## CONCLUSIONS

The high concentration of radon in our study models, exceeding the global limit of radiation and this indicates the presence of depleted uranium in the sites studied and indicates the continuity of exposure to this polluted gas note that the half-life of depleted uranium ranges from 4 to 5 million years.

## RECOMMENDATIONS

Spread environmental awareness among the city's population to show the seriousness of radon and diseases that can result. Use new and different scientific methods

to measure the concentration of uranium and radon for the same areas and compare them with current results.

**Ethical Clearance:** Obtained from College of Education for women, University of Thi Qar, Ira

**Source of Funding:** Self-funded

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# Immunoglobulins Levels in Iraqi Atopic patients (Asthma, Rhinitis and Urticaria)

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## ABSTRACT

One hundred ninety-two patients (82 males and 110 females) with three types of allergic diseases (allergic asthma 60, allergic rhinitis 54, and urticaria 78), and 45 control subjects were tested to determine the levels of IgG, IgM and IgA by using the single radial immunodiffusion technique, and the levels of IgE by the ELISA method. The results revealed an apparent increase in IgE levels and inversely significant decrement for both IgG and IgA in all the three types of the allergies. While there were no substantial differences between IgM levels in allergic asthma, urticaria, and control; only allergic rhinitis showed a significant decrease in the IgM level. The aim of this research is to investigate the relationship between serum level of IgG, IgM, IgA, and IgE in patients with allergic rhinitis, allergic asthma and urticaria. The decreasing level of IgG and IgA, as well as, increasing level of IgE, are associated with the three types of allergies and play an important role in developing the disease.

**Keywords:** Immunoglobulins, asthma, rhinitis, urticaria

## INTRODUCTION

Immunoglobulins (Ig) are glycoproteins synthesized by lymphocytes and plasma cells. They are an essential component of the humoral immune response to remove or destroy any foreign bodies (antigens) such as viruses and bacteria to prevent cell infection. The interaction between B-cells and T-cells are necessary to generate active B-cells, which produces a different class of antibodies: IgA, IgG, IgM, IgE and IgD. Soluble Ab is released into the blood for invading the pathogenic microorganisms<sup>1</sup>.

Asthma, rhinitis, and urticaria are the conditions that depend on many causes linked by hereditary and environmental factors, they also share many pathophysiological characteristics<sup>2</sup>. The Ig have an important role in the immune response of allergic conditions, and play a crucial role in their pathological process<sup>3</sup>.

Immunoglobulin A (IgA) is found in two forms in the human body: secretory IgA, an important first-line defense on the mucosal surface, and serum IgA, that mediates a variety of protective functions during the interaction with specific receptors and immune mediators<sup>4</sup>. The lack or deficiency in this antibody at

the body sites (throat, lung, eye, mouth, genitourinary tract and gastrointestinal tract) cause allergic diseases, autoimmune diseases, chronic diarrhea or recurrent infections<sup>5</sup>. A correlation has been associated with IgA deficiency and the allergic diseases. Around 10% of IgA deficient patients may also be deficient in T-cells, phagocytic cells, sometimes complement<sup>6</sup> and IgG subclass is deficient in asthma patients<sup>7</sup>.

Allergen-specific IgG antibody plays an essential role in immune tolerance to the allergens<sup>8</sup>. IgG autoantibody against IgE or the FcεR1α receptors is produced by 50% of the patients with chronic urticarial<sup>9</sup>, the cross-link with this receptor-induced activation and degranulation of basophils and mast cells followed by releasing histamine<sup>10</sup>.

IgE has been recognized to play an important role in mediating the allergic reaction in asthma; the evidence shows the involvement of IgE in the processing of airway remodeling. It is also linked to allergic rhinitis, sinusitis, food allergy, chronic urticaria, and drug allergy<sup>11</sup>. IgE antibody is attached to basophils, mast cells, and dendritic cells through the IgE receptor (FcεR1α), which is crucial for the activation of these cells during allergen exposure<sup>12</sup>. The effect of IgE is crucial in triggering the

Immune response. It is increased in many conditions such as asthma, allergic rhinitis, eczema, urticaria, atopic dermatitis, and parasitic infection<sup>13</sup>. The highest level of circulating IgE will cause high stimulation surface expression of the FcεR1α receptor in basophils and mast cells<sup>14</sup>. The mast cells activation occurs when an antigen crosslinks IgE molecules that are bound to FcεRI on the surface of the mast cell releasing histamine, leukotrienes and other inflammatory mediators causing immediate allergic symptoms<sup>15</sup>.

### METHODOLOGY

**A. Collection of samples:** Three types of allergies were induced in this study include 54 of allergic asthma (26 males and 28 females), 60 of allergic rhinitis (24 male and 36 female), and 74 from patients with urticaria (47 males and 27 females) with age ranged between 13-65 years from Al-Rasafa Specialized allergy center in Baghdad City. They were compared with 45 healthy subjects (24 females and 21 males). Five ml of blood samples were collected for estimation of total serum IgE by ELISA kit from EUROLIN (Germany) and serum IgG, IgA and IgM by Single radial immunodiffusion assay.

**B. Single radial immunodiffusion assay (SRID):** The (SRID) test was performed by using the LTA Milano kit. The plates were left open at room temperature (25°C) for a few minutes to allow

any condensed water in the wells to evaporate. Then the wells were filled with 5µl of testing sera (patients and control). The plate was left to stay at room temperature after which it was closed and placed in a moist chamber for about 48 hours for IgG, IgA, and 72 hours for IgM. While IgE was tested by ELISA method

**C. Statistical data analysis:** The data were statistically analyzed by the computer program SPSS version 13. Their data were given in terms of standard errors (S.E.), and differences between means were estimated by ANOVA tests. The difference was considered significant when the probability (P) value was ≤ 0.05.

### RESULTS

Serum levels of IgG and IgA in all three types of allergies, asthma, rhinitis and urticaria (1150.36, 1247.21 and 1122.53 for IgG) and (162.66, 164.95 and 167.51 for IgA) respectively, showed a significant decrement when compared with control group (P ≤ 0.001). An inverse result in IgE was observed, which revealed a substantial increment in all the types of allergies (213.61, 247.32 and 220.39 IU/ml). There were no differences in IgM level detected, but allergic rhinitis was statically significant (P ≤ 0.05) Table-1.

It is worth to mention that there were no marked differences in immunoglobulins between males and females for each type of allergy (data not shown).

**Table 1: Immunoglobulins (IgE, IgG, IgA, IgM) Levels in Sera of Patients with allergic asthma, allergic rhinitis, urticaria, and Control Group**

Patient Groups		IgE IU/ml	IgG mg/dl	IgM mg/dl	IgA mg/dl
Allergic asthma N = 54	Mean	213.61	1150.36	144.17	162.66
	Minimum–Maximum	12.35-496.18	366.90-2664.80	11.40-313.80	27.40- 436.50
	Std. Error	32.35	78.87	11.25	19.22
	Significant	*P≤ 0.001	*P≤ 0.001	NS.	*P≤ 0.001
Allergic rhinitis N = 60	Mean	247.32	1247.21	127.93	164.95
	Minimum–Maximum	14.34-476.52	266.90-2263	14.00-293.80	27.40-490.00
	Std. Error	31.76	77.06	9.49	18.78
	Significant	*P≤ 0.001	*P≤ 0.001	*P≤ 0.05.	*P≤ 0.001
Urticaria N = 74	Mean	220.39	1122.53	137.76	167.51
	Minimum–Maximum	19.31-979.60	545.60-1888.20	17.90-284.00	29.80-410.80
	Std. Error	30.52	75.51	7.45	17.38
	Significant	*P≤ 0.001	*P≤ 0.001	NS.	*P≤ 0.001
Control N=45	Mean	28.28	1535.12	158.72	286.39
	Minimum – Maximum	6-71.48	798.80-2606.70	30.70-388.90	81.10-715.70

N= Number, NS= not significant, SE = Standard Error, \*= significant with P value ≤ 0.05

## DISCUSSION

Immunoglobulin's responses in allergic diseases have an important role in the immune system function and play an effective role in their pathogenesis<sup>3</sup>.

A definite reverse result was observed in the level of immunoglobulins: IgA, IgG and IgE in all three allergies types as compared to the control. However, no apparent differences have been shown in the level of immunoglobulin IgM; only the rhinitis patients uncovered distinguishable decrement when compared with control groups. The decrement in IgA and IgG were consistent with other studies. A low IgG1, IgG2, and IgG4 were found in preschool asthmatic children<sup>16</sup>. A review article in 2015 estimated that IgG, IgA deficiency, and IgM deficiency were associated with rhino-sinusitis patients<sup>17</sup>.

A study in Iran revealed decreased in serum level of IgA and increase IgE in patients of asthma and rhinitis<sup>3</sup>. Similar decreasing in IgA was associated with lung functions in the asthmatic patients<sup>18</sup>. It has been suggested that IgA can reduce inflammatory response directly by inhibiting the effector function of inflammatory cells<sup>19</sup>. Serum IgA binding on the surface of monocyte induces the anti-inflammatory cytokine IL-10 expression<sup>20</sup> and inhibits the inflammatory cytokines (IL-6 and TNF $\alpha$ ) (1). The abnormally low level of circulating IgA antibody may explain the pathogenic possibility of these allergic diseases<sup>21</sup>. Allergies may also be more prevalent among individuals with selective IgA deficiency (sIgAD) than in the general population<sup>6</sup>. There is at least one allergic disease among 45.7% of patients with sIgAD, whereas, the prevalence of asthma, allergic rhinitis and eczema is 10.7%, 16.9%, and 2.9%, respectively, in (sIgAD)<sup>22</sup>.

IgE is an immunoglobulin that has an important role in acute and chronic allergic diseases<sup>23</sup>. The significant increase of total IgE in all types of allergies was consistent with previous study that showed that plasma IgE was higher in young adult male than in female with allergic rhinitis and allergic asthma<sup>24</sup>. Researchers in India have documented that circulating IgE are increased in atopic individuals, including rhinitis, asthma, atopic dermatitis, and urticarial<sup>25</sup>. Allergic rhinitis patients with or without asthma showed an increase in serum IgE<sup>26</sup>; it is raised up to 10 times than in normal circulating IgE.<sup>27</sup> A study in China showed that hyper IgE was

associated with asthma, severe atopy, and severe eczema during childhood and adolescence<sup>28</sup>.

Allergic asthma and allergic rhinitis have similar immunological mechanisms, and it is probable that the factors participated in the raising total IgE<sup>24</sup>. The same elevated IgE level in children was associated with severity of asthma<sup>29</sup>. Also, a connection was found between the increasing serum IgE and urticaria severity-93% of these patients suffered from mild to severe chronic urticaria<sup>30</sup>. IgE is believed to be the most important mediator of immediate hypersensitivity reaction among atopic conditions. It has been reported that increasing level of total and specific IgE is associated with severe chronic urticaria<sup>31</sup>.

Mast cells can be activated by binding of IgG autoantibody to the IgE receptors on the surface of this cell. Other activation can also come from type III hypersensitivity through the binding of immunoglobulin IgG and IgM to the FC receptors on the mast cells (10) causing degranulation. However, the increasing number of mast cells, basophils, eosinophils, neutrophils and T-lymphocytes can be seen in chronic urticaria (CU) skin lesions<sup>32</sup> in which mast cells causes degranulation and histamine release<sup>33</sup>.

## CONCLUSION

In conclusion, there was an apparent increase in IgE levels and inversely significant decrement for both IgG and IgA in all the three types of the allergies. While there were no substantial differences between IgM levels in allergic asthma, urticaria, and control; only allergic rhinitis showed a significant decrease in the IgM level. These alterations could provide a potential diagnostic and therapeutic window for allergic diseases.

## RECOMMENDATION

We recommend further study on IgG subclasses and secretory IgA in different types of allergy and their effects on disease severity.

**Ethical Clearance:** Ethical clearance obtained from College of Nursing, University of Baghdad, Iraq

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**Conflict of Interest:** None

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# Role of serum Leptin and Prolactin in Iraqi females' patients with Rheumatoid Arthritis

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## ABSTRACT

Leptin is an adipocyte peptide hormone that is important in preventing obesity by affecting the hypothalamus. Recent studies showed that leptin plays an important role in T lymphocyte responses, modulates inflammatory and immune responses.

This study was evaluating serum leptin and correlation between leptin level with disease activity and duration.

Patients were recruited from rheumatology out-patients clinic at Al-Yarmouk teaching hospital from the period from January to November 2017. A 95 subjects were recruited (70 patients and 25 healthy controls). The serum leptin and prolactin level were significantly higher in RA patients compared to control group after adjusting leptin level to BMI. RA patients had a significantly higher serum triglyceride and significantly lower serum HDL compared to control.

Leptin level was positivity correlated with BMI in both patients and controls. Triglyceride was significantly higher in overweight and obese control than in non-obese control.

Leptin concentration was significantly higher in Patients with high disease activity score (DAS more than 5.1) which included 31 patients than in Patients with low DAS (less than 5.1) which included 39 patients. Higher serum Leptin levels were associated with longer disease duration.

**Keywords:** *rheumatoid arthritis and leptin, rheumatoid arthritis and prolactin*

## INTRODUCTION

Rheumatoid arthritis (RA) is a chronic disease that predominantly affects middle age. Early, pain and stiffness are the major manifestations, eventually, irreversible damage to joints will develops.<sup>[1]</sup> RA is a chronic systemic disease with high concentrations of proinflammatory cytokines, such as (TNF- $\alpha$ , IL-1, IL-6).<sup>[2]</sup>

The synovium is the primary sit affected<sup>[3]</sup>. RA causes significant morbidity and disability.<sup>[4]</sup> Chronic inflammation triggers energy adjustments in the body which include mobilization of fat, increased gluconeogenesis, high-energy expenditure, catabolism of protein and negative nitrogen balance.<sup>[5]</sup>

White adipose tissue (WAT) is an endocrine organ, producing a large number of molecules, as proinflammatory cytokines, as well as the adipocytokines (leptin, adiponectin, resistin and visfatin).<sup>[6]</sup> Leptin,

a 16-kDa non-glycosylated anorexia peptide, hypothalamically modulates body weight, food intake, and fat stores.<sup>[7]</sup>

Leptin is a hormone with multiple effects like regulation of endocrine function and immunity.<sup>[8]</sup> Its circulating levels increase with infection and inflammation, so it's a part of the immune response and host defense.<sup>[9]</sup>

**Leptin:** Leptin is an obese (Ob) gene product cytokine-like 16 KDa peptide produced mostly by white adipose tissue, but other cells can secret it.<sup>[10]</sup> Leptin was primarily act as an-orexigenic hormone which regulates body weight, energy expenditure, food intake, and adipose stores.<sup>[11]</sup>

After being released into the circulation it crosses the blood-brain barrier and acts on the hypothalamus via the neuropeptide Y to induce satiety. It also increases energy expenditure.<sup>[12]</sup>

Leptin has long been recognized to regulate metabolism, neuroendocrine and other physiological functions. Circulating leptin levels are directly related to adipose tissue mass.<sup>[13]</sup>

Leptin plays an important role in the regulation of neuroendocrine function and energy homeostasis.<sup>[14]</sup> and other energy-demanding physiological processes, such as reproduction.<sup>[15]</sup> hemopoiesis.<sup>[16]</sup> and angiogenesis and in the regulation of the immune system in energy or leptin deficient states.<sup>[17]</sup>

Leptin is non-glycosylated peptide hormone.<sup>[18]</sup> with the tertiary structure of a cytokine that is highly conserved among mammalian species.<sup>[19]</sup> Leptin belongs to the class I cytokine superfamily, consisting of a bundle of four alpha helices.<sup>[15]</sup>

It is structurally and functionally related to the IL-6 cytokine family. Leptin functions as a signal in a feedback loop regulating food intake and body weight.<sup>[12]</sup>

Leptin has recently been recognized as a modulator of inflammatory and immune responses.<sup>[9]</sup> by virtue of its interaction with leptin receptors expressed by peripheral blood mononuclear cells, vascular endothelial cells, smooth muscle cells, and osteoblasts.<sup>[13]</sup>

Leptin has a dual role in inflammation. It activates monocyte/macrophage cells and potentiates production of the proinflammatory cytokines.<sup>[20]</sup> and directs T cell differentiation to Th1 phenotype, expressing interferon and IL-2. On the other hand, it expresses certain anti-inflammatory properties by releasing IL-1 receptor antagonist.<sup>[21]</sup>

Circulating leptin concentrations are proportional to total adipose tissue mass and decrease after weight loss. It is also known that leptin levels increase proportionally to glomerular filtration rate (GFR) decrease and are significantly higher in hemodialyzed patients than in healthy subjects.<sup>[22]</sup>

#### Aims of study:

1. Assess the serum level of leptin in patients with RA.
2. The relation between leptin concentrations with disease duration and disease activity in a group of RA patients.
3. assess the effect of RA treatments on leptin concentration.

**Patients and Methods:** The study was retrospective case –control study included 95 subjects, 70 female patients with Rheumatoid arthritis all don't suffer from other autoimmune disorders or chronic diseases. And 25 female healthy control (10 obese and over Weight and 15 non-obese). from the outpatient's clinic of Rheumatology at Al- Yarmouk teaching hospital for the period from January to November 2017.

DAS28 was calculated for each patient by examining erythrocyte sedimentation rate (ESR). Enzyme-linked immunosorbent assay was used for measuring serum Leptin and serum Prolactin levels (ng/mL).

#### STATISTICAL ANALYSIS

The Statistical Analysis System- SAS (2004) was used to effect of difference factors in study parameters. Least significant difference –LSD test or T-test was used to the comparative between means in this study.

#### RESULTS AND DISCUSSION

**Leptin level in Rheumatoid Arthritis patients (RA) and control:** Table (1) shows that the mean  $\pm$  standard error of serum leptin level in Rheumatoid Arthritis (RA) group and in control.

There was a significant ( $P < 0.05$ ) increase in serum leptin concentration in RA patient.

**Table 1: Serum leptin and serum prolactin in Rheumatoid arthritis (RA) patients and control group**

Group	No.	Mean $\pm$ SE	
		Prolactin ng/ml	Leptin ng/ml
Control	25	14.16 $\pm$ 1.37	32.07 $\pm$ 6.80
RA Patients	70	30.68 $\pm$ 3.59	55.32 $\pm$ 4.63
T-test value	---	9.874 *	17.393*
Significantly different at ( $P < 0.05$ ) *, NS: non-significant			

This result is in agree with Otero (2006).<sup>[11]</sup>, Targojska-Stdpniak *et al.* (2008).<sup>[23]</sup> and Olama *et al.* (2012).<sup>[24]</sup> RA characterized by high concentrations of (TNF- $\alpha$ , IL-1, IL-6).<sup>[25]</sup>

Serum prolactin (PRL) concentration was significantly higher ( $P < 0.05$ ) in RA patients. Prolactin level in patients was (30.68  $\pm$  3.59) while in control group was (14.16  $\pm$  1.37) which agrees with (seriolo *et al.* 2002.<sup>[26]</sup> elwakkad *et al.* 2007.<sup>[27]</sup>

**Lipid profile in patients and in control:** Table (2) shows Serum triglyceride and total cholesterol were significantly high, while serum high density cholesterol was significantly lower in patients than in control.

**Table 2: lipid profile of patients and control**

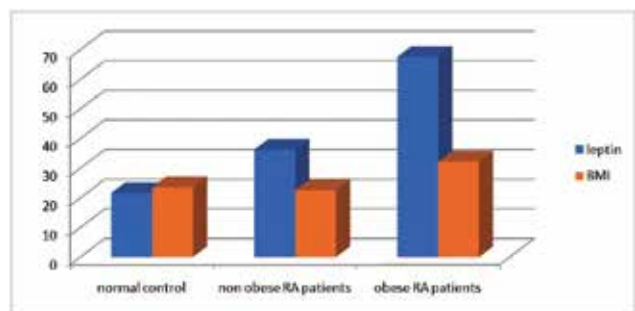
Group	Mean ± SE		
	HDL Mg/dIL	TG Mg/dIL	T-CH Mg/dIL
Control	46.64	154.06	188.59
Patients	31.27	204.88	195.74
LSD value	8.488 *	13.815 *	11.225 NS
Significantly different at (P<0.05) *, NS: non-significant			

The majority of patients with RA have increased levels of inflammatory markers, and sustained inflammation. Thus, our findings and others emphasize the importance of interpretation of lipid levels in the context of inflammatory activity in people with RA.

**Leptin and BMI:** Figure (1) show correlation between serum leptin concentration and body mass index (BMI) in RA patients and in control group.

The data showed that the mean serum leptin concentration was positively correlated with body mass index. Correlation coefficient = (0.59) for patients at P value of (0.01).

Many studies have been done on obese and non-obese human subjects showed a strong positive correlation between serum leptin concentration and body mass index (Pi-sunyer2000<sup>[28]</sup>, Seufert 2004<sup>[29]</sup> and Rosenbaum *et al.* (1996) <sup>[30]</sup> demonstrated that serum leptin concentration is increased in obese subjects and closely related to BMI.



**Figure 1: Diagram shows the correlation between leptin Level and body mass index in patients, control and obese patients**

**Leptin and disease activity score:** Table (3) shows mean ± standard error for serum leptin concentration in RA patients with high DAS (≥ 5.1) and low DAS (<5.1).

**Table 3: Shows leptin concentration of leptin in patients with high . DAS and patients with low DAS**

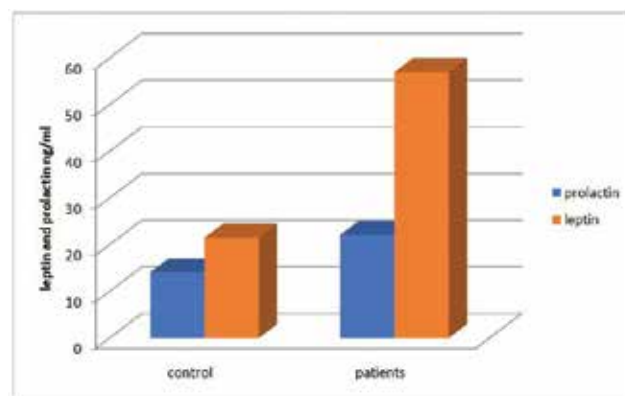
DAS28	No.	Liptin (ng/ml)
Less than 5.1	39	35.29 ± 3.05
More than 5.1	31	80.51 ± 7.65
T-test value	---	15.223 *
Significantly different at (P<0.05) *		

This finding disagrees with Wisiovska *et al.* (2007).<sup>[31]</sup> this is may be due to the small sample size which was only 30 patients and those patients had a disease activity score ranging from (4.8-6.2) while the current study included 70 patients with (RA) with disease activity score ranging from (2.4-8.5) which gave as more space to correlate between the two variables.

Targojska-Stdpniak *et al.*, (2008).<sup>[23]</sup> agrees with our findings they found that serum leptin levels are significantly higher in patient with high disease activity score than in patients with low disease activity score

A follow up study done by lee *et al.* (2007).<sup>[32]</sup> with 16 of the 26 patients with active RA and collected serum samples again when their diseases were well-controlled (DAS28 < 3.2). They found that their leptin levels significantly decreased as their disease improved

**Leptin and prolactin:** Both leptin and prolactin were significantly higher in patients, the mean for leptin concentration was (55.32 ± 4.63) while the mean for prolactin concentration was (30.68 ± 3.59) (figure 2). And this agrees with Ram *et al.* (2004).<sup>[33]</sup>



**Figure 2: Diagram shows the difference in mean leptin conc., prolactin conc. in patients and control**



**Disease activity score in rheumatoid factor positive and rheumatoid factor negative:** There are no significant differences in the level of leptin and prolactin in rheumatoid factor positive and negative patients. Targojska-

Stdpniak *et al.* (2008).<sup>[23]</sup> demonstrated that serum leptin levels were not associated with the presence of rheumatoid factor (RF)

The disease activity score in RF positive patients was ( $5.72 \pm 0.32$ ) which is significantly higher than the mean of disease activity score in RF negative patients which was ( $4.30 \pm 0.24$ ).

**Leptin and disease duration:** Serum Leptin Level was found to be higher in patients with long disease duration. leptin level for patient who had rheumatoid arthritis for less than 10 years was ( $42.41 \pm 2.97$ ), patients who had rheumatoid arthritis for less than 20 years their leptin level was ( $44.06 \pm 10.44$ ) and in patients with disease duration more than 20 years their leptin level was ( $116.33 \pm 12.32$ ).

This finding agrees with Olama *et al.* (2012).<sup>[24]</sup> who found that serum leptin level is significantly correlated with the RA duration.

Many studies reported that serum leptin concentration is not correlated with disease duration (Popa *et al.* 2005.<sup>[34]</sup> Wisniewska *et al.* 2007.<sup>[31]</sup> Hizmetli *et al.* 2007.<sup>[35]</sup> on the other hand, Bokarewa *et al.* 2003.<sup>[36]</sup> found that there was a gradual increase in leptin concentrations with the duration of RA.

**Leptin and treatment:** There was no significant positive correlation between serum leptin concentration and different treatments for Rheumatoid arthritis and this agrees with (Targojska-Stdpniak *et al.* 2008.<sup>[23]</sup> and disagrees with Bokarewa *et al.* (2003)<sup>[36]</sup> who found Patients treated with DMARDs other than MTX had significantly lower leptin levels in plasma than those having no immune modulating treatment this is may be due to their larger sample size in each group.

## CONCLUSIONS

1. A significant increase was observed in circulating leptin and prolactin levels in patients with RA.
2. Serum Leptin levels was positively correlated with RA disease activity, disease duration and BMI

3. RA patients had a significantly higher levels of total cholesterol, triglyceride and significantly lower level of HDL.

## RECOMMENDATIONS

1. Future studies should be performed to determine whether therapies interacting with leptin signaling would be of value in the treatment of patients with arthritis and other immune-mediated inflammatory disorders.
2. Perform a follow up studies for RA patients on monotherapies to evaluate the effect of these therapies on leptin level on these patients.
3. study the impact of recombinant leptin and leptin antagonist in induced models of arthritis such as antigen induced arthritis or collagen induced arthritis.

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**Ethical Clearance:** Taken from scientific committee in AL-Mustansiriyia collage of medicine department of medicine-Iraq-Baghdad-AL Quadisyia

**Conflict of Interest:** Nil

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# Peroxisome Proliferator Activated Receptor (PPAR) Delta Genetic Polymorphism in Saudi Normal Population

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## ABSTRACT

**Background:** Peroxisome proliferator-activated receptors (PPARs) are transcription factors that belong to the superfamily of nuclear hormone receptors. Three PPARs members, PPAR-alpha, PPAR- delta and PPAR-gamma, have been characterized. PPAR-delta in humans is encoded by the PPARD gene and has been shown to possess a role in regulating fatty acid catabolism and energy homeostasis. Several polymorphisms have been identified in PPARD as potential functional variants. PPARD +294T > C polymorphism was shown to modify serum lipid concentrations in some ethnic groups.

**Aim:** The current study aimed to screen the presence of the PPARD polymorphism in the Saudi population.

**Method:** Blood samples were collected from normal individuals. Genomic DNA was extracted from peripheral blood mononuclear cells and the partial gene of the PPARD was amplified by polymerase chain reaction and subjected to gel electrophoresis. PPARD rs2016520 polymorphism was analyzed by polymerase chain reaction–restriction fragment length polymorphism.

**Results:** The frequencies of CC, CT, and TT genotypes in normal Saudi population were 9.09%, 14.2% and 76.6%, respectively.

**Conclusion:** The Saudi nationals seems to have low frequency of the PPARD +294T > C polymorphisms.

**Limitations:** Relatively small sample size, serum lipid levels were not determined.

**Keywords:** Peroxisome proliferator-activated receptors, PPARD and polymorphism.

## INTRODUCTION

The peroxisome proliferator-activated receptors (PPARs) are a family of ligand-activated nuclear

hormone receptors encoded by different genes and act as transcriptional regulators<sup>1</sup>. The PPAR family is composed of three different members, PPAR-alpha (PPAR $\alpha$ ), PPAR-delta (PPAR $\delta$ ) and PPAR-gamma (PPAR $\gamma$ ), distinguished mainly by tissue distribution<sup>2</sup>. PPAR $\alpha$  is mostly expressed in brown adipose tissue and liver but also can be found in kidney, heart and skeletal muscles. PPAR $\gamma$  is mostly expressed in adipose tissue, and in a lower degree in colon, the immune system and the retina. PPAR $\beta/\delta$  is expressed in several tissues but mostly in the gut, kidney and heart<sup>1</sup>. Various researches have shown that both PPAR $\alpha$  and PPAR $\gamma$  have a key role in the regulation of glucose and lipid homeostasis. However, less is known about PPAR $\delta$  and its role is still under debate<sup>2-4</sup>.

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The PPAR $\delta$  gene that encodes human PPAR $\delta$  is located in the short arm of chromosome 6 at position 6p21.2-p21.1 with 11 exons covering around 35 Kbp. It is expressed ubiquitously, thus disturbance in its level or activity may lead to various metabolic traits<sup>5</sup>. Ligand activation of PPAR $\delta$  was suggested to increase fatty acid catabolism in skeletal muscle and to modulate insulin sensitivity<sup>4</sup>. In addition, there is an evidence that PPAR $\delta$  can also play an important role in modulating gastrointestinal physiology and disease<sup>6</sup>. Studies have also shown that PPAR $\delta$  can be of great importance in different vascular processes and this may indicate that PPAR $\delta$  can be a modulator of cardiovascular disease<sup>7</sup>.

Previous studies have identified several polymorphisms as potential functional variants<sup>8–13</sup>. These variants may have a role in modifying its mRNA and protein levels that may disturb other genes regulated by PPAR $\delta$ . The +294 T > C (rs2016520), also called -87 T > C or +15C > T), is a variant that possesses a T/C transition in the 15<sup>th</sup> nucleotide of the 4<sup>th</sup> exon located 87 nucleotides upstream of the start codon. This polymorphism was initially described by Skogsberg et al. (2003) in association with human cholesterol metabolism<sup>14</sup>. In this study, plasma LDL- cholesterol concentration were shown to be higher in homozygous carriers of the rare C allele than in homozygous carriers of the common T allele. This was shown to be related to higher transcriptional activity found in the rare C allele than the common T allele. Other studies have linked the PPAR $\delta$  +294T > C polymorphism with the modification of serum lipid concentration in the general population and with the risk of coronary artery disease in different clinical scenario including: dyslipidemic female, hypercholesterolemic male and cholesterol metabolites in patients with Alzheimer's disease<sup>15–24</sup>. In contrast, others studies have not found a similar association between PPAR $\delta$  +294T > C polymorphism and serum lipid concentration<sup>12,20</sup>. This may indicate different effect of this polymorphism in different populations. Thus, our aim was to explore the presence of PPAR $\delta$  +294T > C polymorphisms in the Saudi general population.

## MATERIALS AND METHOD

**Materials:** A total of 154 samples (60 females and 94 males) were randomly selected from a previously obtained convenience sample of Saudi participants.

**Blood Samples:** Blood samples were collected on sodium citrate containing vacutainer tubes. Blood sample was first

diluted v/v with phosphate buffer saline (pH 7.2) and gently layered onto equal volume of Ficoll- Histopaque-1077 (Sigma-Aldrich). The tubes were centrifuged 40 min at 400 x g. The PBMC was separated in another tube and centrifuged at 300 g for 10 min. The supernatant was discarded and the material precipitated was washed with 1 mL PBS and stored at -20C till being used.

**DNA amplification:** Genomic DNA was isolated from peripheral blood leukocytes using QIAamp DNA Blood extracted kit (Qiagen) according to the manufacturer's instructions. Polymerase chain reaction and restriction fragment length polymorphism (PCR-RFLP) were used to perform genotyping of the PPAR $\delta$  +294T > C polymorphism [reference]. PCR amplification was performed using For 5'-CATGGTATAGCACTGCAGGAA-3' and Rev 5'-CTTCCTCCTGTGGCTGCTC-3' as previously described<sup>12</sup>. Each amplification reaction was performed using 100 ng genomic DNA in 25  $\mu$ L of reaction mixture consisting of 1.0  $\mu$ L of each primer (10  $\mu$ mol/L), 6  $\mu$ L 5x FIREPol® Master with 12.5 mM MgCl<sub>2</sub> (Solis Biodyne).

After initial denaturizing at 95°C for 5 min, the reaction mixture was subjected to 30 cycles of 30 s denaturation at 95°C, 30 s annealing at 50°C and extension 40 s at 72°C, followed by a final 10 min final extension at 72°C. After electrophoresis on a 2.5% agarose gel with 0.5  $\mu$ g/mL ethidium-bromide

**Genotyping:** Individual PCR amplicons were subjected to enzymatic digestion using 5 U of *Bs*II restriction enzyme (Thermo Scientific) according to the manufacturer's instruction. Briefly, 10  $\mu$ L of PCR amplicon, 18  $\mu$ L RNase free water, 2  $\mu$ L 10x Tango buffer and 1  $\mu$ L of the *Bs*II were mixed gently and incubated at 55°C overnight.

The mixture was subjected to electrophoresis using 2.5% agarose gel and visualized with ethidium-bromide staining ultraviolet illumination. A single band of 269 bp indicates the absence of the recognition site denotes homozygous T allele (TT genotype), while the presence of the recognition site indicates C allele which is either heterozygous (bands at 269, 167, and 102; TC genotype) or homozygous (two bands at 167, 102 bp; CC genotype).

**Statistical analysis:** The statistical differences between the respective PPAR $\delta$  genotypes were determined using Friedman and Chi-Square test in the SPSS 16.0 software (SPSS, Chicago, IL, USA).

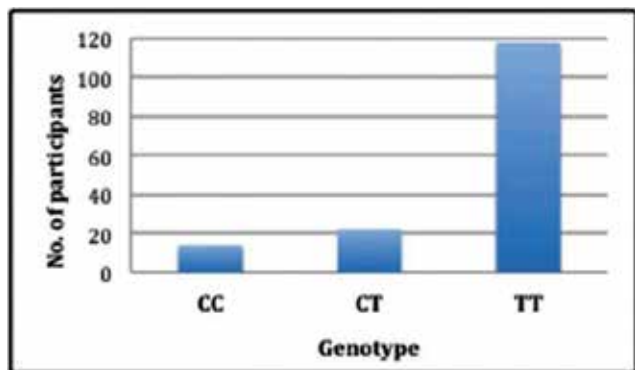
## RESULTS

Genotyping study revealed that all the previously reported PPARD +294T > C polymorphisms were present in the Saudi normal population (Fig.1).



**Figure 1: PPARD +294T > C polymorphism among Saudi normal population. Lane M, 100 bp marker ladder; lane 1, CC genotype (167- and 102-bp); lanes 2-6 TT genotype (269 bp); and lane 7, TC genotype (269-, 167- and 102-bp).**

Of the 154 participants, the T allele was significantly higher (118; 76.6%) than the C allele (14 ; 9.09% for CC and 22; 14.2% for CT)  $p > (0.001)$  (Fig. 2) with no relation to sex (data not shown).



**Figure 2: The frequency of the genotype CC, CT and TT among Saudi normal population.**

## DISCUSSION

Previous studies have investigated the presence and frequencies of PPARD +294T > C polymorphism in different ethnic groups. The possible association of this polymorphism with several health conditions including serum lipid level, obesity, cardiovascular diseases and type 2 diabetes mellitus was also examined. However, the results are inconsistent across ethnic groups.

The PPARD +294T > C polymorphisms were found to be significantly associated with cholesterol metabolism<sup>14</sup>. LDL- C concentration were shown to be higher in homozygous carriers of the rare C allele

than in homozygous carriers of the common T allele due to higher transcriptional activity. No association was found with HDL-C levels. Aberle et al. (2006), indicated that the rare C allele was highly associated with low HDL-C levels in dyslipidemic female subjects but not the LDL-C levels<sup>17</sup>. Yan et al. (2005) demonstrated that total cholesterol and LDL-C levels in metabolic syndrome patients with CC genotype were higher than those with TT and TC genotypes<sup>16</sup>.

Nikitin et al. (2010) showed that the PPARD +294T > C polymorphism was associated with high levels of LDL-C and total cholesterol in Russian population<sup>12</sup>. In addition, Luo et al (2015) have compared serum level in long-lived population (LG) in Bama region (China) with non-LG and found that CC carriers showed higher LDL-C level in LG but lower TC, TG and LDL-C in non-LG compared to TT carriers. Carriers of the C allele (TC/CC) in LG showed higher TC, TG, and LDL-C levels than in non- LG of the same genotype and the same lipid parameter<sup>24</sup>.

On the other hand, Gouni-Berthold et al. (2005) reported that there was no association between the rare C allele and either TG, HDL-C, or LDL-C levels in male or female diabetic and non-diabetic German controls<sup>23</sup>.

Similarly, no association between the rare C allele and serum lipid levels was found in both CAD patients and healthy controls in the Tunisian population<sup>20</sup>. Shin et al. (2014) also reported that there were no significant associations between the PPARD +294T > C polymorphism and the risk of type 2 diabetes. However, associations were detected between fasting plasma glucose and BMI and the PPARD +294T > C polymorphisms in nondiabetic control subjects<sup>8</sup>.

Additionally, Wei et al. (2011) reported that the impact of PPARD +294T > C polymorphism on serum lipid levels were not constant between nondrinkers and drinkers. The levels of total cholesterol in nondrinkers were not identical in the three genotypes. The rare C allele was shown to be associated with highest serum total cholesterol levels than other genotypes. However, the levels of all seven-lipid traits among the three genotypes in drinkers were similar<sup>25</sup>.

There are variations as well in the frequencies of the PPARD +294T > C polymorphisms across different ethnic groups. The frequency of the rare C allele was

18.3% in Russian endurance-oriented athletes compared to 12.1% in controls<sup>12</sup>. In the Tunisian population, the frequency of the rare C allele was 32.0% in CAD patients compared to 18.9% in healthy volunteers<sup>21</sup>.

In addition, it was 30.8% in Chinese CAD patients compared to 19.5% in normal controls<sup>24</sup>. On the other hand, Gouni-Berthold et al, (2005) stated that there were no differences in the frequency of the rare C allele between the diabetic patients and the non-diabetic controls (18.7% vs 19.2%)<sup>23</sup>.

Similarly, Yan et al (2005) demonstrated that there were no differences in the frequency of the rare C allele between patients with metabolic disease, primary hypertension and diabetes mellitus type 2. There was also no significant difference in the frequency of the rare C allele between non-drinkers and drinkers (25.8% and 23.8%, respectively)<sup>16</sup>. Lack of differences in the frequency or genotype distribution was also reported among other groups of subjects in other studies<sup>25,26</sup>.

Finally, the frequency of the rare PPAR $\delta$  C allele in normal Saudi population demonstrated in our study (9.09%) seems to be lower than the frequencies in normal controls of other populations.

It was 12.1% in normal Russian controls<sup>12</sup>, 15.6% in normal controls from the northern part of the greater Stockholm area<sup>14</sup>, 19.5% in normal controls from Chinese Anhui Province<sup>22</sup>, 18.9% in normal controls from Tunisia<sup>20</sup>, 19.2% in non-diabetic controls from Germany and<sup>23</sup>; 29.3% and 32.9% in LG and non-LG<sup>24</sup>, respectively.

This may indicate that the prevalence of the C allele variants may have an ethnic and/or disease specificity. Further studies in the Saudi population with larger sample size to investigate the frequency of the different alleles and their associations with different diseases (if any) are needed.

**Conflict of Interest:** None

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# Spiritual Resilience Model on Drug Abuse Intensity among Senior High School Students, South Kalimantan: A Path Analysis

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## ABSTRACT

Resilience is the way individuals to manage stress in life to reduce negative consequences and relate to health status, resilience is influenced by several factors, spiritual, family support, peer support, self-concept, and coping. As far we know, no study mentioned about spiritual resilience as a mediator between these factors and drug abuse intensity, so the aim of this study was to develop a spiritual resilience model on drug abuse intensity among senior high school students in South Kalimantan with mediators of spiritual resilience. This study used a cross-sectional design and self-report questionnaires. The population in this study was senior high school students in South Kalimantan, and used cluster random sampling technique. Total sample was 243. Data was collected using self-report questionnaires. All questionnaires except spiritual had a Cronbach alpha > 0.5. This study showed that family support, peer support, self-concept, and coping were predictors of drug abuse intensity and spiritual resilience was a mediator between variables, except coping. Model fit indices goodness of fit index (GFI) = 0.988, adjusted GFI (AGFI) = 0.918, comparative fit index (CFI) = 0.985 and root mean squared error of the approximation (RMSEA) = 0.089. Path analysis suggests developing interventions to prevent abuse in senior high school students based on a model of spiritual resilience.

**Keywords:** *spiritual resilience, drug abuse, senior high school, students, path analysis*

## INTRODUCTION

Drug abuse among students is common. There was 1 in 5 students in the Czech Republic, France, Iceland, Switzerland and the United Kingdom which have drug abuse behavior (19-22%)<sup>(1)</sup>. In Indonesia, there was an increase in the prevalence rate of drug abuse from 2005 until 2015 and most of them were students (22%)<sup>(1)</sup>. In South Kalimantan there were 1,519 people with drug abuse, and 231 students who were positive drug users<sup>(1)</sup>.

Drug abuse had negative effect on social and occupational functions. Such as bad mood, disrupt in daily activity, and social aggressive<sup>(1,2)</sup>. Many Factors contributes on drug abuse behavior among adolescents, it was related with peer group<sup>(3)</sup>, emotional problems<sup>(4)</sup> and stressor<sup>(5)</sup>. Teenagers must be able to manage stressors and problems in their life to reduce negative consequences such as drug abuse behavior<sup>(6)</sup> and it relates to health status<sup>(7)</sup>. This situation is called resilience<sup>(6)</sup>. In addition religion coping is often used by

drug abusers during rehabilitation. They try to increase spiritual beliefs and pray or meditate when depressed. Drug abusers generally chose to pray and get closer to God due to this condition<sup>(8)</sup>. Resilience and spiritual are coping strategies among drug abusers to face their condition<sup>(6,8)</sup>.

There is one model in term of concept of resilience, namely resilience illness model<sup>(7)</sup>. This concept explained that resilience was influenced by several factors, such as family support, peer support, self-concept, coping, and spiritual. Our study used spiritual resilience as a mediator on drug abuse intensity<sup>(9)</sup>. The aim of this study will understand spiritual, family support, peer support, self-concept, coping and resilience spiritual on drug abuse intensity. Individuals with the ability to resilience could prevent from drug abuse<sup>(6)</sup>. Better understanding about this model can educate about how to prevent drug abuse intensity and promote factor related to drug abuse intensity among senior high school students.

**METHOD**

**Participants and settings:** This study used a cross-sectional and correlation design. The variables of this study were family support, spiritual, peer support, self-concept, coping, spiritual resilience on drug abuse intention. This study was conducted in five high schools in South Kalimantan, and used cluster random sampling technique. Data was collected from July to August 2018.

This study measured 7 latent variables. The number of parameter was 24 in this model. Each parameter should have 10 subjects <sup>(10)</sup>, thus the sample size 240 adolescents were recommended to test this model. The participants were allowed to withdrawal in this study after looking the questionnaires. We ensure confidentiality of answers.

**Instruments:** We used self-report questionnaires to collect the data. We used demographic questionnaires to ask age, gender, parent’s education, parents smoking status, living with parents or not, and environment with drug abuse.

**Spiritual:** We used Glock dan Stark (1965) to measure spiritual <sup>(11)</sup>. It has 4 domains, belief, practice, experience, and consequence. Total item is 12 items. Cronbach alpha for this questionnaire in this study was 0.382. It had low internal reliability, so we exclude from this study.

**Family support:** We modified Friedman questionnaire <sup>(12)</sup> and Ilmi’s questionnaire <sup>(13)</sup> to measure family support. It has 3 domains that were emotional dimension, Information dimension, and instrument dimension. Total item was 12 items.

**Peer support:** We modified questionnaire from Malecki dan Elliott to measure peer support <sup>(14)</sup>. It had 12 items.

**Self-concept:** We developed self-concept questionnaires from Stuart dan Sundeen (1991) <sup>(12)</sup>, Tennessee Self Concept Scale <sup>(15)</sup>. Self-concept is 16 items with 4 domains, self-image (body image), self-ideal, self-esteem, and self-rule.

**Coping:** We used A-Cope (*Adolescent-Coping for Problem Experiences*) (16). It had 10 items with two domains, maladaptive and adaptive coping.

**Spiritual resilience:** Spiritual resilience was measured using a WHO questionnaire, a questionnaire used to measure a person’s ability to recover from stress. The questionnaire consisted of 4 dimensions, protective, resilient behavior coping, protective sources, and personal characters. It had 16 items.

**Drug abuse intention:** This questionnaire is used to measure drug addiction problems. The questionnaire consists of environmental dimensions, achievement, and learning and it had 12 items.

**Statistical analysis:** All analyses use the SPSS version 18.0 for Windows computer software (*p* value of < 0.05 are considered to describe statistically significant differences). Descriptive statistics (means and frequencies) are used for all variables. A Pearson correlation analysis will use to explore the relationship between the scores of family support, peer support, self-concept, coping, spiritual resilience on drug abuse intention. To estimate the hypothesized model fit with the actual data are used AMOS 20.0 (i.e., path analyses). Model fit analysis is assessed using the following fit indices and the cut off points (GFI > 0.90; CFI > 0.9) (17) and RMSEA < 0.1 <sup>(18)</sup>.

**FINDINGS**

**Characteristics of Respondents:** In term of characteristics of respondents. Most of respondents’ age was 16 years (59.7%). The proportion of gender almost equals. Most of respondents living with their parents (89.7%) and 33.3% respondents had friend with drug abuse.

**Description of Study Variables:** The range, mean, standard deviation, and Cronbach alpha’s  $\alpha$  were calculated for all variables (table 1). The Cronbach Alpha for all variables were > 0.5, it was considered acceptable (19, 20) except spiritual, so we exclude this variable.

**Table 1: Description of study variables**

Variabel	N Total = 243	%	Range	Mean	SD	Cronbach Alpha
<b>Spiritual</b>						
Good	240	98.8	12-48	35.78	3.7	0.382*
Poor	3	1.2				

Conted...

<b>Family support</b>						
Good	239	98.4	12-48	38.55	4.3	0.662
Poor	4	1.6				
<b>Peer support</b>						
Good	242	99.6	12-48	40.5	3.9	0.593
Poor	1	0.4				
<b>Self Concept</b>						
Good	239	98.4	16-64	47.7	4.7	0.627
Poor	4	1.6				
<b>Coping</b>						
Good	221	90.9	10-50	36.54	5.2	0.601
Poor	22	0.1				
<b>Spiritual Resilience</b>						
Good	241	99.2	16-64	53.51	5.3	0.734
Poor	2	0.8				
<b>Drug abuse intensity</b>						
Good	234	96.3	12-48	36.57	4.4	0.613
Poor	9	3.7				

**Correlation among variables (Family support, peer support, self-concept, coping, spiritual resilience on drug abuse intention):** Table 2 showed that significant positive correlation existed among total score of family support, peer support, self-concept, coping, spiritual on intention of drug abuse (higher score indicate good intention or never doing drug abuse).

**Table 2: Correlation among variables (Family support, Peer support, self-concept, coping, spiritual resilience on drug abuse intention)**

	<b>Family support</b>	<b>Peer support</b>	<b>Self-concept</b>	<b>Coping</b>	<b>Spiritual resilience</b>	<b>Drug abuse intensity</b>
Family support	1					
Peer support	.474**	1				
Self concept	.487**	.203**	1			
Coping	.271**	.232**	.473**	1		
Spiritual resilience	.384**	.327**	.270**	.352**	1	
Drug abuse intensity	.458**	.425**	.440**	.482**	.476**	1

\*\* p value < 0.01

**Summary of Model Graph Results:** The final model after excluding path coefficients which are not significant showed goodness of fit index (GFI) = 0.988, adjusted GFI (AGFI) = 0.918, comparative fit index (CFI)= 0.985 and root mean squared error of the approximation (RMSEA) was 0.089.

**Table 3: Summary of Model Graph Results**

<b>Hypothesis</b>	<b>Coefficient path</b>	<b>Standard error</b>	<b>T-value</b>	<b>p-value</b>	<b>Remarks</b>
Family support → Spiritual resilience	0.246	0.080	3.803	0.05	Supported

Conted...

Family support → Drug abuse intensity	0.135	0.064	2.147	0.032	Supported
Family support → Coping	0.438	0.057	8.182	0.019	Supported
Peer support → Spiritual resilience	0.155	0.089	2.353	0.05	Supported
Peer support → drug abuse intensity	0.200	0.064	3.484	0.05	Supported
Coping → Drug abuse intensity	0.155	0.057	2.595	0.009	Supported
Coping → Resilience	0.003	0.081	0.045	0.964	Not supported
Self-Concept → spiritual resilience	0.253	0.060	4.321	0.05	Supported
Self-concept → drug abuse intensity	0.248	0.048	4.348	0.05	Supported
Spiritual resilience → drug abuse intensity	0.234	0.045	4.241	0.05	Supported

**Direct, Indirect, and Total Effects of Dominants Factors on drug abuse intensity:** Table 4 showed direct, indirect, and total effects of dominants factors on drug abuse intensity. Based on path coefficient, the strongest total effect, direct, and indirect effect on drug abuse intensity were peer support, self-concept, and family support.

**Table 4: Direct, Indirect, and Total Effects of Dominants Factors on Drug Abuse Intensity**

Total Effect				
	Self-concept	Coping	Spiritual resilience	Drug abuse intensity
Peer support	0.232		0.214	0.308
Family support		0.438	0.246	0.260
Self-concept			0.253	0.307
Coping				0.155
Spiritual resilience				0.234

Direct Effect				
	Self-concept	Coping	Spiritual resilience	Drug abuse intensity
Peer support	0.232		0.155	0.200
Family support		0.438	0.246	0.135
Self-concept			0.253	0.248
Coping				0.155
Spiritual resilience				0.234

Indirect Effect				
	Self-concept	Coping	Spiritual resilience	Drug abuse intensity
Peer support			0.059	0.108
Family support				0.125
Self-concept				0.059
Coping				
Spiritual resilience				

## DISCUSSION

This study showed that family support, peer support, self-concept, coping, spiritual resilience had a significant relationship with drug intention (table 2 and table 3). These findings are consistent with previous studies<sup>(21-23)</sup>.

### **Resilience Spiritual as Predictor on Drug Abuse**

**Intensity:** This study showed that spiritual resilience is a predictor of drug abuse intensity (table 3). Resilience is the way individuals to manage stress and problems in life for reducing negative consequences and relate to a person's health status<sup>(7)</sup>. All respondents were high school students in South Kalimantan. Spiritual resilience is mediator between family support and peer support on drug abuse intentions (Table 4). The majority of respondents had good spiritual resilience (table 1) and good drug abuse intentions (never using drugs). Spiritual activity contributes to recovery from drug abuse behavior<sup>(24-26)</sup>. Further research is needed to develop spiritual resilience among senior high school students to prevent drug abuse behavior.

### **Self-Concept and Coping as Predictor on Drug Abuse**

**Intensity:** This study showed that self-concept is a predictor of drug abuse intensity (table 3). The majority of respondents had a good self-concept and good intensity. This finding is consistent with previous study that a good self-concept is needed to prevent abuse, previous studies related with alcohol abuse<sup>(27)</sup> and this study related with drug abuse intensity. Further research is needed to establish self-concept to prevent drug abuse. Self-concept influences the intention of drug abuse through spiritual resilience (total effect = 0.307, p value <0.05).

### **Family Support and Peer Support as Predictor on Drug Abuse Intensity:**

This study showed that family support was a predictor in drug abuse intensity (table 3). Less communicative, less attention, less sharing affection and lack of respect in family members, tend to make children do drug abuse behavior<sup>(28)</sup>. Further study is needed to develop family support intervention to prevent drug abuse. Peer support is also a predictor of drug abuse intention (table 3). Teenagers are influenced by their group. Adolescents are more vulnerable with negative social influences<sup>(29)</sup>. Further research is needed to develop peer support as intervention to prevent drug abuse.

## LIMITATION

Some limitations need to be considered in this study. The causal direction in path analysis must be interpreted

carefully because of the cross-sectional method in data collection. A longitudinal study is needed for further research. Research related to interventions is needed to prevent drug abuse based on this model.

## CONCLUSION

Family support, peer support, coping, self-concept, and spiritual resilience are predictors of drug abuse behavior in adolescent through spiritual resilience as a mediator.

**Ethical Clearance:** All procedure of this study was granted IRB from Health Research Ethics Committee, Universitas Muhammadiyah Banjarmasin, South Kalimantan, Indonesia.

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**Conflict of Interest:** This study had no conflict of interest.

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# The Effect of Given Information, Knowledge and Community Participation of Family Planning Village Programs in East Java Province-Indonesia

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## ABSTRACT

The achievement of the targets of the Population and Family Planning development sector is not yet reached, it is characterized by the Population Growth Rate of 1.36%, Total Fertility Rate (TFR) 2.4, the Contraceptive Prevalence Rate (CPR) all methods 64%. One of the implementation from the Population and Family Planning and Family Development (PFPPD) program through KB (Family Planning) villages is still weak in terms of knowledge and community participation. So it is necessary to increase the knowledge and participation of the community in the KB village.

This study was an observational descriptive study with a cross sectional design. The population in this study were Fertile Age Couples (FAC) aged from 15 to 49 years old, with 100 people in total consisting of 50 FACs from Tuban Regency and 50 FACs from Malang City with sistematic random sampling method from a list of all FAC in the KB Village. This study was conducted on March 2017 and August 2017.

The results showed that the provision of information had an effect on knowledge with p-value (0.00), knowledge had an effect on the achievement of KB villages with p-value (0.045). But the provision of information does not directly affect the achievement of the KB village. Whereas the staff visit did not affect the knowledge and achievements of the KB village. Respondent characteristics influence the knowledge and achievement of KB villages with p-value (0.00).

The conclusion of this study is that the provision of information influences people's knowledge, and knowledge influences the achievement of the KB family in terms of the number of children. If someone has obtained information about family planning including family planning villages, it will increase their knowledge about the ideal number of children, thus influencing the achievement of the KB family in terms of the number of children desired is enough children.

**Keywords:** *knowledge, participation, family planning (KB) village*

## INTRODUCTION

The Population, Family Planning and Family Development Program (KKBPK) conducted by the National Population and Family Planning Agency (BKKBN) seeks to realize the Indonesian Government's Development Priority Agenda (Nawacita) for 2015-2019 period, especially in the 3rd Priority Agenda "Building Indonesia from the Frontier by Strengthening Regions and Villages in the framework of the Unitary

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State”, for 5th Priority Agenda “Improving the Quality of Indonesian Human Life” as well as the 8th Priority Agenda for “National Character Revolution” through Population and Family Planning Development<sup>(1)</sup>.

Family planning village programs is form of support for the Nawacita program. The launching of the program is a step to provide counseling to the community so that receiving family planning services can be more efficient and faster. Family planning village programs is one of the miniature models of KKBPK Program which involves all sector within the BKKBN and in synergy with Ministries or institutions, work partners, stakeholders of the relevant agencies in accordance with the needs and conditions of the region, and carried out in the lowest level of government (according to the prerequisites for determining the location of KB villages) in all districts and cities in the province of East Java<sup>(1)</sup>.

KB villages are expected to be one of the strategic innovations to implement the KKBPK program priorities and the achievement of the targets of the Population and Family Planning development sector is not yet reached, it is characterized by the Population Growth Rate of 1.36%, Total Fertility Rate (TFR) 2.4, the Contraceptive Prevalence Rate (CPR) all methods 64%<sup>(2)</sup>.

Moreover, BKKBN itself has compiled the 2015-2019 Strategic Plan with 6 (six) strategic targets that have been set, namely: (1) reducing the average Population Growth Rate (PGR) from 1.38% per year in 2015 to 1.21% per year in 2019, (2) the decrease in the Total Fertility Rate (TFR) from 2.37 per Woman of Childbearing Age (WCA) in 2015 to 2.28 in 2019, (3) the increase in Contraceptive Prevalence Rate (CPR) of all methods from 65, 2% of the total Fertile Age Couples (FAC) in 2015 to 66% in 2019, (4) the decline in family planning needs is not served by unmet need from 10.6% in 2015 to 9.91% in 2019, (5) the decrease in the Age Specific Fertility Rate (ASFR) of 46 per 1000 women in the age group 15-19 years in 2015 to 28 per 100 women in the same group in 2019, (6) the decrease in the percentage of unwanted pregnancies from WCA from 7.1% in 2015 to 6.6% in 2019<sup>(1)</sup>.

Davis (2001) explains that participation is the determination of the attitudes and involvement of each individual’s desire in the situation and condition of the organization so that it ultimately encourages individuals to participate in achieving their organizational goals, as

well as taking part in each shared responsibility. Good development in the activities of implementation planning, utilization, or evaluation, where a person or group of people contribute directly in the form of material and non-material<sup>(4)</sup>. Community participation in KB program is defined as community support with a measure of community willingness to participate in implementing the program and all activities based on initiatives from individuals and the community. The purpose of the study is to analyze the influence of the level of information provision, knowledge and community participation on the implementation of the program family planning village in East Java.

**METHOD**

This study was an observational descriptive study with a cross sectional design. The population in this study were Fertile Age Couples (FAC) aged from 15 to 49 years old, with 100 people in total, consisting of 50 FAC from Tuban Regency and 50 FAC from Malang City. They were chosen by sistematic random sampling from a list of all FAC in the KB (Family Planning) Village. This research was conducted between March 2017 and August 2017 in KB Village Bulu Meduro Village - Banjar District - Tuban Regency and KB Village of Kota Lama Subdistrict - Kedung Kandang District-Malang City. Data collection method that used were primary data with questionnaires and in-depth interviews, and direct observation. The validity of the data in this study uses source triangulation. Analysis of the data used in this study are data collection, data reduction, data presentation, data analysis and conclusion drawing.

**RESULT**

The results of the study are as follows:

- 1. Characteristics of respondents:** Characteristics of respondents in this study include age, work, and education.

**Table 1: Characteristics of respondents**

Characteristics of respondents	n = 100	
	F	%
<b>Age</b>		
15-19	1	1
20-29	21	21



Conted...

30-39	57	57
40-49	21	21
<b>Type of work</b>		
Housewife	82	82
Entrepreneur	12	12
Government Employee	2	2
Employee	4	4
<b>Level of Education</b>		
No Formal Education	3	3
Elementary Student	52	52
Junior High School Student	28	28
High School Student	15	15
Bachelor	2	2

Table 1 shows that the majority of respondents aged between 30-39 years is 57% and employment status as a housewife is 82%. The education level of the majority of respondents graduated from elementary school by 52%.

**2. Knowledge:** Respondents' knowledge in this study includes knowledge of KB villages, knowledge of Toddler Family Development (BKB), Adolescent Family Development (BKR), Elderly Family Development (BKL), Youth Counseling Information Center (PIKR), Family Income Improvement Business (UPPK).

**Table 2: Community's Knowledge about the KB Village Program**

Knowledge Variables About KB Village Program	PUS Knowledge Percentage				Total
	With Knowledge		Without Knowledge		
	n	%	N	%	
KB Village	78	78	22	22	100
Toddler Family Development	51	51	49	49	100
Adolescent Family Development	26	26	74	74	100
Elderly Family Development	36	36	64	64	100
Youth Counseling Information Center	10	10	90	90	100
Family Income Improvement Business	21	21	79	79	100

Table 2 explained that the majority of respondents had 78% knowledge of KB villages, 51% knowledge of under-five family development. About 74% of respondents did not have knowledge about adolescent family development, 90% did not have knowledge about adolescent counseling information center and 64% of respondents did not have knowledge about elderly family development. In addition, the majority of respondents did not have knowledge about the business of increasing income incomes by 79%. From these data, it can be concluded that the majority of respondents did not fully know about the village KB program.

### 3. Community Participation

**Table 3: Community's participation in KB Village program**

Variable of Community participation	Statement of Respondents				Total
	Participating		Not participating		
	n	%	N	%	
Participating as administrator for KB Village	41	41	59	59	100
Officer visit	64	64	36	36	100
Giving Information	70	70	30	30	100

According to table 3 it can be seen that the community participation in participating in the KB family program was 41% and the visit of officers in providing information on village KB programs was 64% and the provision of information followed by the community was 70%. The following are the results of the variable linear regression test to answer the research objectives.

**Table 4: Test Results of Variable Influence on Knowledge and Community Participation**

	Original Sample (O)	T Statistics ( O/STDEV )	P Values	Significance
X1.Information Giving → Y1.Knowledge	0.650	7.429	0.000	Sig
X1.Information Giving → Y2.Achievement of the program	0.173	1.279	0.202	Not Sig
X2.Officer visit → Y1.Knowledge	-0.061	1.306	0.192	Not Sig
X2.Officer visit → Y2.Achievement of the program	0.045	0.584	0.559	Not Sig
X3.Respondent Characteristics → Y1.Knowledge	0.362	3.522	0.000	Sig
X3.Respondent Characteristics → Y2.Achievement of the program	0.621	3.940	0.000	Sig
Y1.Knowledge -> Y2.Achievement of the program	-0.330	2.012	0.045	Sig

According to table 4, it can be seen that the provision of information has an effect on knowledge with p-value (0,00) then knowledge affects the achievement of village KB with p-value (0,045). But the provision of information does not directly affect the achievement of the KB village. Whereas the staff visit did not affect the knowledge and achievements of the KB village. Respondent characteristics influence the knowledge and achievement of KB villages with p-value (0.00).

**FINDINGS**

**The Effect of Information Giving on KB Village Program Knowledge:** Based on the results of the study, it is showed that the level of knowledge of respondents about village KB was 78%, knowledge of BKB was 51% and the majority of respondents did not have knowledge about BKR of 74%. In addition, the majority of respondents do not have knowledge about PIKR of 90% and do not have knowledge about BKL of 64% and do not have knowledge about UPPK of 79%. From these data it can be concluded that the majority of respondents did not fully know about the KB village program.

The regression test results indicate that the provision of information has an effect on knowledge with p-value (0.00) then knowledge has an effect on the achievement of KB village with p-value (0.045). This means that the provision of information has an effect on knowledge and knowledge influencing the achievement of KB villages in terms of the number of children. If someone has obtained information about family planning including family planning villages, it will increase their knowledge about the ideal number of children, thus influencing the achievement of the KB family in terms of the number of children desired is enough children.

Ariesta (2011) explains that there is a significant effect between providing information on increasing knowledge of families who have elderly in Kampung Tua Dapur 12, Sei Pelunggut Village, Sagulung District, Batam City. Someone’s knowledge is influenced by several factors, one of which is information that is an alternative to convey information both through print media and health workers such as through counseling, counseling and other activities<sup>(4)</sup>.

This study is in line with the previous researchers conducted by Wadu et al (2016) that the pattern of disseminating information about the Elderly Family Planning program in empowering the elderly runs maximally through interpersonal communication or Family Planning Counselors (FPC). This communication is carried out by the group through service and counseling accompanied by an interactive approach to cadres and home visits<sup>(5)</sup>.

The results of the study stated that there was an effect of providing information in the form of counseling or counseling about the KB village program, which increased the respondents’ knowledge about the KB village program by disseminating information about the KB village program. So that it can be concluded that the provision of information on Elderly Family Development (BKL) is very influential in creating a strong, productive elderly and improving the quality of life of the elderly according to the BKKBN program.

**Effect of Community Participation on KB Village Programs:** Based on the results of the study, the level of community participation in participating as administrators of the KB village program was still low with achievement of 41%. Davis (2001) defines public participation as feed-forward information and feedback information. The definition of community participation is

defined as a continuous two-way communication process that can mean that public participation is communication between the government as policy holders and the public on the other hand as parties who directly feel the impact of the policy<sup>(5)</sup>. The lack of activity of cadres is caused by cadre activities because they are actively working. The activities carried out by BKL group only provide guidance to families that have elderly people, but for activities carried out by the elderly themselves it is carried out in the kelurahan. The constraints faced by BKL are the absence of funds used for activities and the decline in activeness of cadres<sup>(5)</sup>.

Ariesta's research (2011) shows the problem in BKB's development was the limited time and cadres which resulted in less effective implementation. Information about BKL, BKR, BKB is not routinely delivered every month to the community because of limited time in PKK activities and personnel who provide guidance<sup>(3)</sup>. The inhibiting factors for the achievement of the KB village program are the lack of active cadres participating in KB family program, the lack of support and responses from the community for KB Village program in Tuban District and Malang City.

Institutional factors that influence the implementation of the KB Village in Tuban and Malang are related to the proportional number of family planning counselors, the availability of the budget for the KKBPK program from the regional budget (APBD) and National budget (APBN) and other funding sources such as the Village Fund Budget (ADD), family hope program (PKH), membership of BPJS, availability of operational facilities, both contraception and other supporting facilities. This is in line with Merrynce (2013) findings in a study in 2013, namely the dominant factors affecting the effectiveness of KB family planning programs are communication factors and resource factors where resource factors emphasize the availability of family planning counseling human resources, budget for implementing programs and facilities for family planning tools owned. Limited human resources is the main obstacle in the effort to convey information to the community<sup>(6)</sup>.

## CONCLUSION

The provision of information influences knowledge with p-value (0.00) then knowledge influences the achievement of village KB with p-value (0.045). But the provision of information does not directly affect the achievement of the KB village program. Whereas the staff visit did not affect the knowledge and achievements of the KB village program. Respondent characteristics

influence the knowledge and achievement of KB village program with p-value (0.00). The inhibiting factors for the achievement of the KB program are the lack of active cadres participating in running the KB family program, the low level of community support, the low response from the community to the KB village program in Tuban District and Malang City.

**Conflict of Interest:** Authors declare that the information above is correct and the manuscript submitted by us is original. We have no conflict of interest to declare and certify that no funding has been received for the conduct of this study and preparation of this manuscript.

**Source of Funding:** This research is self-supporting and BKKBN founding

**Ethical Clearance:** We would like to thank the Ethics Committee for basic science research/clinics at Faculty of Public Health Airlangga University the ethical approval granted for this study. Our gratitude also goes to all the participants involved in this study for their commitment.

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# Effect of Bone Morphogenetic Protein-4 on the Expression of BMP-7 In Bone Repair

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## ABSTRACT

**Background:** BMPs play important roles in normal bone development and regulation of bone repair by their ability to stimulate osteogenesis, cell differentiation and apposition of bone matrix.

**Aim of study:** to find role for the application of BMP4 in bone defect with expression of BMP7 by newly formed bone.

**Materials and Method:** Twenty male Wistar rats were used to create a drill-hole injury (3mm) bone defects in femur, one in the left side represented the control, while the right side represented the experimental. The study groups include:

- Control group, the bone defect was left without treatment.
- Experimental group, the bone defect treated with 0.5 µl of BMP4.

Bone repair was examined histologically and immunohistochemically for the expression of BMP7 at the postoperative periods 14 and 28 day.

**Result:** Show increased bone formation with proceeding time postoperatively for both study groups, although experimental group illustrates more bone apposition that filled the defect at 28 day. Moreover intense positive expression of BMP7 by stromal and bone cells were illustrated in experimental group with high significant differences in comparison to control.

**Conclusions:** BMP4 seems to play an important role in bone repair; induced expression of BMP7 correlates with the bone repair outcome.

**Keywords:** bone morphogenic proteins, bone repair, bone signals, bone cell, BMP7, osteogenesis

## INTRODUCTION

BMPs are a subfamily of the transforming growth factor-β (TGF-β) superfamily with comprising activins and inhibins. The bone-inducing BMPs can be divided into several subgroups, according to their amino acid

sequences<sup>[1,2]</sup>. BMP-2 and BMP-4 comprise one of osteogenic subgroup.<sup>[3]</sup>

Various animal studies and preclinical trials, that have been performed to demonstrate the efficacy of BMP4 in accelerating bone regeneration and fracture healing.<sup>[4,5]</sup>

Bone repair required an adequate cellular environment, sufficient growth factors, a bone matrix and mechanical stability.<sup>[6,7]</sup>

BMPs play an important role in bone formation. BMP activities are regulated at different molecular

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levels.<sup>[8]</sup> In bone, BMPs are produced by osteoprogenitor cells, osteoblasts, chondrocytes and platelets and cell differentiation and stimulation of bone healing are closely related to family member of BMP.<sup>[9,10,11]</sup>

This study was performed to investigate the role of application of BMP4 with expression of BMP7 in repaired bone.

### MATERIALS AND METHOD

**Animals:** Twenty male Wistar rats, weighting (0.25 – 0.30 kg), aged 4-5 months were used and maintained under control conditions of temperature, drinking and food consumption and all experimental procedures were carried out in accordance with the ethical principles of animal experimentation. In each rat, a drill-hole injury 3mm bone defects were created in femur ,one in the left side represented the control ,while the right side represented the experimental. The study groups include:

- Control group,the bone defect was left without treatment.
- Experimental group ,the bone defect treated with 0.5 µl of BMP4

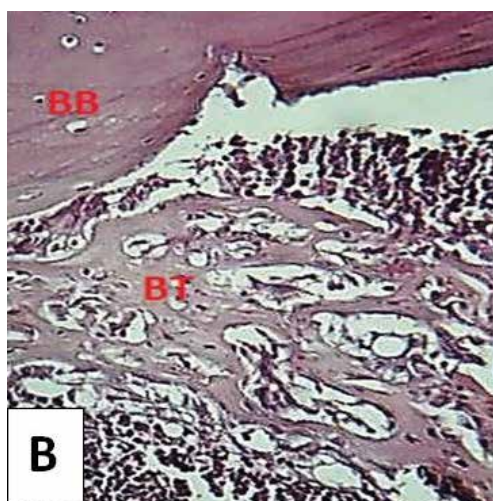
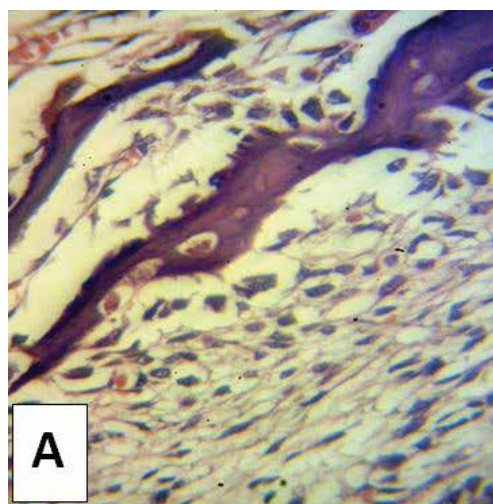
#### Materials

- BMP4 peptide (ab178442) 100µg was reconstitute in water to a concentration of 0.01 mg/ml and used for experimental group.
- Immunohistochemical Polyclonal Antibodies ,Bone morphogenic protein7 antibody (BMP7) from Abcam Company UK (ab56023).

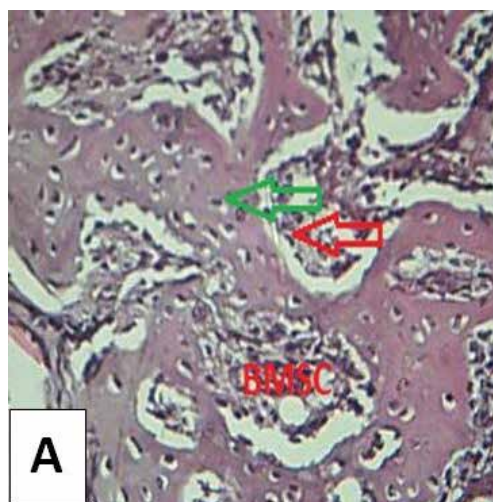
**Method:** After scarifying the animals at postoperative periods (14,28 days), ten animals for each period .The specimens were fixed by 10% buffered formalin for 3 days.The samples then demineralized, dehydrated, and embedded in paraffin,5µm section was analyzed for immunohisologic evaluation of BMP7.

**Immunohistochemical scoring of BMP7:** Quantification method of Immuno-reactivity was estimated for positive cell that expressed BMP7 .It was assessed by identifying and scoring 100 cells in five fields (X40) along bone area of different sections ,the scoring is: (Score 0, none; score 1, <10%; score 2, 10-50%; score 3, 51-80%; score 4, >80%).<sup>[12]</sup>

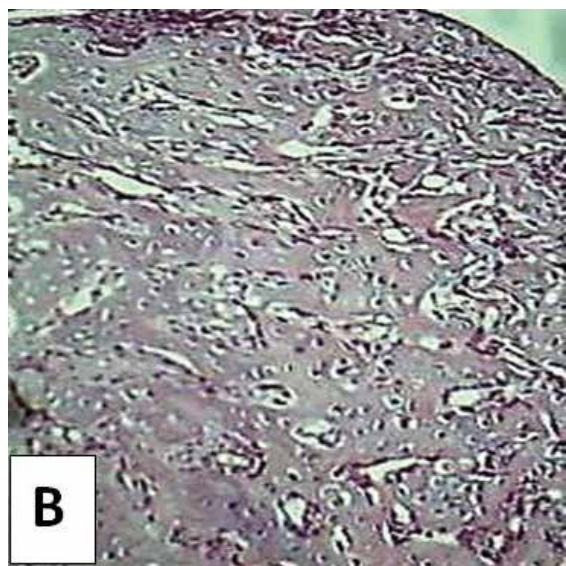
### RESULTS



**Figure 1: bone healing (control)**  
**A. Bone trabeculae at 14 day post surgically .H&E x20.**  
**B. bone trabeculae (BT) coalesce with basal bone(BB) at 28 day postoperative, H&Ex10**







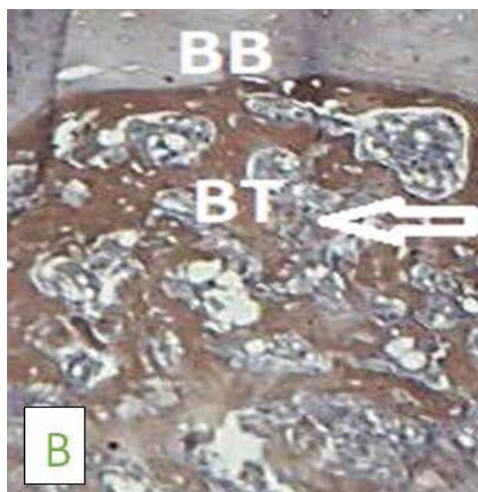
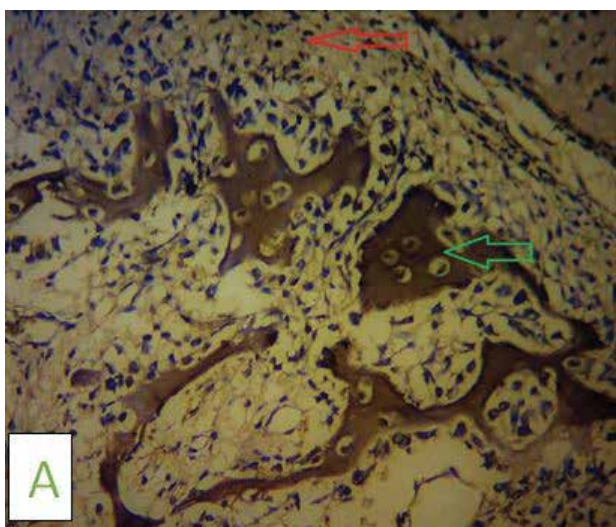
**Figure 2: Bone healing (experimental)**

**A.** Bone trabeculae at 14 day post surgically. shows bone mesenchyme stem cell (BMSC), osteoblast (red arrow), osteocyte (green arrow) H&E x20.

**B.** New bone filled the defect, at 28 day post operative. H&E x10

- **Histological examination** for both study groups shows formation of bone trabeculae at 14 day postoperative, and with more apposition of bone matrix at 28 day. Although volume of newly bone that apposed in experimental group illustrated to be obviously greater in comparison to control at different study periods. Figures(1,2)

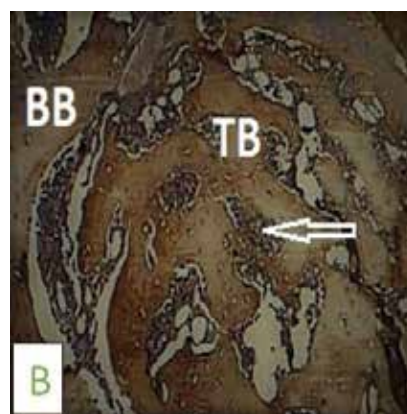
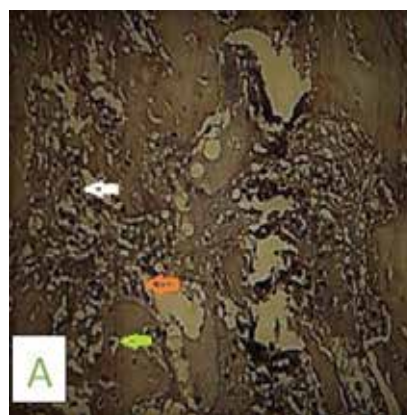
- **Immunohistochemical investigation** for the positive expression of BMP7 by stromal cell, bone mesenchymal stem cell, bone cells (include osteoblast, osteocyte) were evaluated, as counting and scoring of positive cells.



**Figure 3: Positive expression of BMP7 by (control).**

**A.** At 14 day, bone mesenchymal stem cell (red arrow); osteocyte (green arrow). DABx20

**B.** At 28 day, bone mesenchymal stem cell (white arrow), bone trabeculae (BT). DABx10



**Figure 4: Positive expression of BMP7 by (experimental).**

**A.** At 14 day, bone mesenchymal stem cell (white arrow); osteocyte (yellow arrow), osteoblast (orange arrow). DABx10

**B.** At 28 day, bone mesenchymal stem cell (white arrow), bone trabeculae (BT) coalesce with basal bone (BB). DABx10

Figure(3,4) show intense positive DAB stain by newly bone tissue in experimental group in comparison to control. The results confirmed by statistic analysis of

the data ,which revealed a high significant difference in the mean of positive cells specifically at day 28 postoperative. Tables(1,2,3)

**Table 1: Observed Frequencies of the Studied immunohistochemical scoring of BMP7 in different groups by different (S.O.V.) BMP7 Score**

Groups Score	14 Days	28 Days
Control Score-1	4	4
Score-2	1	1
Score-3	0	0
Score-4	0	0
Exp. Score-1	2	3
Score-2	2	2
Score-3	1	0
Score-4	0	0

**Table 2: Summary Statistics of the Studied No. of Positive Cells expressed BMP7 in the Studied Groups**

Groups	Periods	Mean of +ve cell	Std. Dev.	Std. E.	95% for mean		Min.	Max.
					L.B	U.B		
Control	14 day	23.8	1.6	0.7	22.2	25.5	22	26
	28 day	16.5	0.6	0.3	15.3	16.7	15	17
Exp.	14 day	49.0	2.6	1.1	44.6	51.0	45	50
	28 day	26.9	1.0	0.4	25.6	27.8	26	28

**Table 3: Multiple Comparisons by (LSD Method) of Positive cells count for BMP7 Parameter According to different Groups in compact form**

LSD test					
Periods	Groups		Mean Difference	Sig.(*)	C. S.
14 day	Control	Expem.	-0.20	1.000	NS
28 day	Control	Expem.	-0.94	0.918	HS

(\*) HS: Highly Sig. at P< 0.01; Non Sig. at P> 0.05

### DISCUSSION

The osteogenic function of BMPs had been examined by many past researches, mainly using osteoblasts culture with exogenous treatments of BMPs [13]. Based on their potent osteogenic abilities, many experimental and clinical trials have been initiated to use BMP2 and BMP7 to improve fracture repair [14,15].

Genetic, biochemical, and pharmacological studies have identified and characterized, factors involved in the conversation between BMPs and bone cells during both bone formation and repair [16]. Our results illustrate an enhancement of bone formation after local application of BMP4 in bone defect .BMP4 also acts to recruit and activate osteoblast chemotaxis, differentiation, and

matrix mineralization. Positive expression of BMP7 in experimental group that combined with osteogenic activity confirm the importance of these two BMP 4 and 7 in acceleration of bone healing. Several BMPs are expressed in distinct temporal and spatial patterns during bone repair[17]. Of these, bone morphogenic protein7, and is of particular interest because of its ability to induce osteogenesis. Suggesting a functional role for BMPs in bone repair and formation.

### CONCLUSION

The role of the Bone morphogenetic proteins 4 with 7 (BMP4, BMP7) that both are recognized as candidate growth factors with significant potential in bone tissue engineering as well as bone repair.

**Ethical Clearance:** All work of this study had done according to the National Council's guide for the care of laboratory animals.

**Source of Funding:** By ours

**Conflict of Interest:** Nil

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# Measuring *Escherichia coli* in foods and Beverages towards Certification of Cafeteria in Campus

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## ABSTRACT

**Aims:** To measure *Escherichia coli* in foods and beverages sold by cafeterias in a campus.

**Method:** This research used cross-sectional design using the structured questionnaire in June-July 2011. The number of samples was 230 food and beverages taken from 13 locations consisting of 42 vendors. Analysis of *E. coli* conducted in the Laboratory of Environmental Health Faculty of the Public Health University of Indonesia used Membrane Filter Method with CFU (Colony Forming Units) as a result. Analysis of certification of hygiene and sanitation performed using instruments or the form of Ministry of Health Decree Number 715/MENKES/SK/V/2003.

**Results:** The contamination more than 50 %, showed in food (79.5) was higher than the drinks. Only 5,74 % cafeterias allow the score of Ministry of Health Decree Number 715/MENKES/SK/V/2003 standard for Hygiene and Sanitation.

**Conclusions:** *E. coli* contamination in foods was higher compared with beverages. Most of the cafeterias on campus did not allow the standard. It needed the training to improve the knowledge of food handlers, owner, and manager concerning the hygiene and sanitation cafeterias and do assessment and development the instrument which proper to all cafeterias.

**Keywords:** cafeteria, *Escherichia coli*, hygiene, sanitation, food handler, beverage

## INTRODUCTION

All of the cafeterias in the university are visited by many students, lecturers and academic staff every day. Foods must be free of bacteriological contamination. University is very concerning about food processing and immense influence in support of nutrition students. Even though, there are relatively affordable price, food vendors still have to pay attention to personal hygiene and the environment in which sales of food, or better known as food hygiene and sanitation<sup>[1]</sup>. Based on research conducted Suleman, that only 28% of the 100 food handlers have received training on hygiene and sanitation, and the calculation of hygiene only obtained 10% from 72 canteens, and have not a certificate of physical feasibility of hygiene and sanitation<sup>[2]</sup>.

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It is necessary to build mechanisms or procedures for certificate hygiene and sanitation for food vendor in Cafeteria in University. With the certification that refers to the street vendors Regulation of Health Minister Number 715/MENKES/SK/V/2003, then the vendor in the cafeteria at the university will get a certificate of "Hygiene and Sanitation" that would be a model for other vendors or merchants in the University in Indonesia. Also, It's would like Vendor in Singapore, France, Japan has a certificate. The instrument is obtained from these assessments will be registered by a patent certification.

## METHOD

This study was cross-sectional, which consisted of an interview survey using instruments on food handlers and managers, observations (checklist) to sanitation facilities, laboratory examinations of food and beverages as well as the source of water in the cafeteria/restaurant at the UI extension, the questionnaire interviews and

observations in the handlers/renderer of food as well as sampling the food sold University of Indonesia Depok campus cafeteria in June-July 2014. Identification of *E. coli*. on food and beverages and water was done by the Membrane Filter Method, the resulting unit is the CFU (Colony Forming Units). Analysis of the hygiene and sanitation performed using instruments or the form of Ministry of Health Decree Number 715/MENKES/SK/V/2003.

**RESULTS**

Number samples were 230 samples, 186 samples were food (80.9%) and 44 samples was drinks/juices (19.1%). Samples were taken from 13 locations consisting of 42 vendors. Based on Laboratory analyses, 230 samples (foods and drink) that is sold in the cafeteria on campus most of the contaminated *Escherichia coli* (61.7%). Neither food nor drink, more than 50% contaminated with *E. coli*, but contamination of food is greater (79.5) than in drink (57.5%).

**Table 1: Laboratory analyses Contamination of Escherichia coli on samples (186 foods and 44 drinks)**

Samples	<i>Escherichia coli</i>				Total	
	Negatif		Positif			
	n	%	n	%	n	%
Foods	79	42,5	107	57,5	186	100,0
Drinks	9	20,5	35	79,5	44	100,0
Total	88	38,3	142	61,7	230	100,0

**Note:**

Positif, if laboratory analyses for *Escherichia coli* > 0

Negative, , if laboratory analyses for *Escherichia coli* = 0

**Table 2: Score Hygiene and Sanitation Assessment**

Result	Number of Vendors	%
Qualify (score < 65)	10	5,74
Not Qualify (score ≥ 65)	164	94,26
Total	174	100,0

Score Hygiene and Sanitation Assessment was based on the 715/2003 Ministry of Health Decree’s scores. There are 28 points about Hygiene and sanitation

statement that the vendor has to answered. This score show qualification in Hygiene and sanitation of Vendor. The result is 94.26% not qualified for hygiene and sanitation. It shows a very bad condition and must be managed properly.

**DISCUSSION**

Identification of contamination of *E. coli* is one indicator of bad or good management of food and drink, therefore it is necessary to improve the condition of food and drink management. Improved management can be done by doing repairs on the variables contained in the instrument assessment of hygiene and sanitation qualification. If this can be done, it is expected to reduce the possibility of contamination of *E. coli*, which means increasing the ability to manage food/drink hygiene and sanitation. In fact, this is not entirely due to hygiene and sanitation facilities that do not qualify, possibly also due to the instrument used does not fit the area. This is what needs to be done in order to obtain an assessment instrument in accordance with the cafeteria on campus.

Many factors influence the occurrence of diseases transmitted by food and many other factors that cause the contamination of *E. coli* in foods, it still required further analysis or research to improve the quality of food and beverages sold in the cafeteria and the campus environment for the development of a standardized instrument certification.

Overall this study shows that 13 locations in the campus cafeteria still a high level of contamination of *E. coli* in foods (57.5%) and beverages (79.5%). Almost all drinks are served by mixed between sugar/coconut milk and its contents, such as the mixed ice, ice cantaloupe, fruit soup, coconut ice, grass jelly ice, ice ‘cendol’, ice seaweed, all of them positive *E. coli* although in varying amounts. The cafeteria is not qualified in hygiene and sanitation (95%).

The management of canteen must be organized to find out where the possibility of contamination in every product, both food, and beverages. Knowing the location/process/ instrument potential contamination will facilitate the manipulation for the improvement/enhancement to ensure the management/management of the physical-worthy beverage food hygiene and sanitation. If the assessment or evaluation can be standardized, it will be used as a method of evaluation (certification) for the management of the canteen or similar nature to assess the risk of contamination that can be made into rules for managing the canteen or the like.

Measuring of food contamination in the same area also done<sup>[3]</sup>. Food contamination could be caused by many factors. Many studies claimed that the largest percentage of foodborne diseases caused due to poor handling procedures<sup>[4-6]</sup>. Shigella, Hepatitis A, and other infections can be all easily transmitted to the restaurant's customers through improper hand washing the infected food handlers<sup>[7]</sup>. The most factors claimed makes a role in enteric viruses transmission is food handler contamination<sup>[8]</sup>. Those all because of the food handlers have poor knowledge about hygiene and sanitation.

According to the Ministry of Health Decree Number 715/MENKES/SK/V/2003, training is needed to make knowledge and practice better. The training not only addressed to food handlers only, but also to the owner and manager. Generally, however, training is evaluated through a standardized test and give a certificate<sup>[9]</sup>. The impact of food handler training was measured by comparing rates of total and critical violations from routine inspections of food services establishments before (2001-2004) and after (2005-2007)<sup>[10]</sup>.

## CONCLUSION

As a conclusion, that a large percentage food quality served cafeterias around campus was under standard quality by Ministry of Health Decree Number 715/MENKES/SK/V/2003 both in *Escherichia coli* standard and hygiene and sanitation. It is needed training to improve the knowledge and practice for food handlers, owners and managers of cafeterias. Certification of Hygiene and Sanitation for each cafeteria would be a guarantee for food contamination.

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**Competing Interests:** The authors declare that there are no competing interests.

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# Spousal Communication on Family Planning and Contraceptive Adoption in Indonesia

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## ABSTRACT

**Background:** This study assesses the degree of spousal communication on family planning associated with contraceptive adoption in Indonesia.

**Method:** The analysis of this study was derived from the 2012 Indonesia Demographic and Health Survey (IDHS). This study utilizes both bivariate and logistic regressions.

**Results:** Findings indicate that 53.3% of respondents had never communicated family planning with their spouses while 46.7% of respondents had communicated before. About 31.3% male respondents were more likely to use contraception if they had discussions on family planning with their spouses. Multiple logistic regression analyses revealed that spousal communication is highly associated with region of residence (OR=1.5; 95% CI=1.4-1.8), exposure of family planning message through television (OR=1.8; 95% CI=1.6-2.0), and contraceptive use (OR=1.8; 95% CI=1.5-2.0).

**Recommendation:** Family planning discussion appears to increase mutual agreement regarding childbearing and contraceptive use among couples. In Indonesia, an intensive effort to target men is needed to both enhance the spousal communication and adopt contraception.

**Keywords:** *Spousal communication, family planning, contraception adoption, Indonesia.*

## INTRODUCTION

Many studies in reproductive health, family planning and contraceptive issues have focused on women. Since the 1994 International Conference on Population and Development (ICPD) which held in Cairo, it has been extensively known that decisions regarding family planning and childbearing issues do not purely rely on women, but rather with both spouses.<sup>1</sup>

Communication on family planning (FP) represent mutual responsibility between husbands and wives in reproductive health behaviour.<sup>2,3</sup> If couple discuss family planning issue more frequently, they will produce better reproductive decision.<sup>3,4</sup> the decision on contraceptive methods, time to use contraception, and the number of children.<sup>5-7</sup> Couples who discuss family planning matters have better understanding the advantages and disadvantages of each contraceptive methods.<sup>8</sup> Some researchers argued that the spousal communication depends on the knowledge and perception of males towards family planning.<sup>9-13</sup> The others suggest that marital duration and education may influence the spousal

communication.<sup>8,14-16</sup> Moreover, the access towards media e.g. television (TV), radio, and newspaper/magazine are associated with the increasing frequencies of family planning discussions among couples.<sup>17</sup> Therefore, this study attempts to examine patterns and determinants of family planning communication among couples and contraceptive adoption in Indonesia.

Communication regarding family planning is still less popular to be discussed among couples in Indonesia. The contraceptive issue in Indonesia is still considered as women's domain because of their natural capabilities to be pregnant and childbearing. As the result, only one man compares to twelve women in Indonesia use contraception.<sup>18</sup> The prevalence rate for male sterilization had steady in 0.2% from 2007 to 2012.<sup>18,19</sup> Condom prevalence rate had increased slowly from 1.3% in 2007 to 1.8% in 2012.<sup>18,19</sup> The rate for periodic abstinence decreased from 1.5% in 2007 to 1.2% in 2012 while withdrawal has also dropped from 2.1% in 2007 to 1.3% in 2012.<sup>18,19</sup> Therefore, this study attempts to examine patterns and determinants of family planning communication among couples and contraceptive adoption in Indonesia.

**METHOD**

The 2012 IDHS had included both men and women as their respondents. Thus, this study utilizes data which are drawn from the 2012 IDHS.<sup>18</sup> The couple dataset has data for married or living together men and woman who both declared to be married (living together) to each other and with completed individual interviews. There are 8,225 couple in which both partners were successfully interviewed. This reported study is based on unweighted data because the sample weights are available only for men or women, not for couple.<sup>20</sup>

The dependent variable was spousal communication, coded 0 if husbands and wives had never discussed family planning and 1 if they have discussed family planning during a year preceding the survey. The response options in the survey were “never”, “once or twice” and “more often”. The available data on spousal communication on family planning were collected from wives’ responses. The independent variables of this study were region of residence (Java Bali and Outer Java Bali Islands); husband’s and wife’s age; husband’s and wife’s education; husband’s and wife’s knowledge on contraception; husband’s and wife’s exposure of family planning from radio, television (TV), newspapers/magazines, contraceptive use, number of living children, and duration of marriage.

The Statistical Package for Social Science (SPSS) version 23 was employed to analyze the data. Univariate analysis was used to reveal the frequency distribution of each variable. Bivariate analysis was applied to see the association between frequencies of spousal family planning communication and selected independent variables. In multivariate analysis, the logistic regression was conducted in measuring the effect of several significant independent variables towards spousal communication on family planning. Only the final model will be discussed in the study.

**RESULTS**

The result of the bivariate analysis showed that couples living in Java-Bali islands were found significantly to communicate family planning more often than couples living in outer Java-Bali islands (49% compared to 45.8%). A little more than half of the couples 53.3% had never discussed family planning with their spouses. Only 34.3% of respondents reported

spousal communication once or twice and 12.5% of them reported frequent spousal communication in family planning. Communication of family planning was often (50.9%) when the couples had married between 5-14 years. Spousal communication was often high among couples currently using any contraceptive method (68.7%) than couples who were not using any contraceptive methods (14.8%). About 49% of couples whose husbands heard family planning on television communicated about it with their spouses. Family planning communication revealed higher on couples whose husbands know modern contraceptive methods (47.9%) than couples whose husbands do not know any modern contraceptive methods (13.4%).

Results from the multivariate models of spousal communications on family planning are presented in Table 1. Region of residence, wife’s education, marital duration, husband’s contraceptive use, and family planning exposure towards husband through television had been considered as strong predictors toward spousal communication. Among those variables, husband’s exposure on family planning message through television had a significant correlation towards spousal communication than other variables (OR=1.8; 95% CI= 1.6-2.0).

**Table 1: Logistic Regression Predicting Spousal Communication on Family Planning in Indonesia, 2012**

Variables	OR <sup>†</sup>	[95% CI] <sup>††</sup>
Region of living (r: Outside Java Bali) <sup>‡</sup>		
Java Bali	1.543***	[1.36, 1.76]
Wife’s education (r: No education and primary)		
Secondary	1.163**	[1.003, 1.35]
Higher	1.488***	[1.20, 1.84]
Marital duration (r: more than 15 years)		
0-4 years	1.508***	[1.26, 1.80]
5-14 years	1.635***	[1.41, 1.89]
Contraceptive use reported by husband (r: No)		
Yes	.581***	[.51, .67]
Hear family planning on TV: husband (r: No)		
Yes	1.822***	[1.59, 2.09]

\* p≤.10 \*\*p≤.05 \*\*\*p≤.001

† OR = Odds ratio.

†† CI = Confidence Interval.

‡ r = Refers to reference category

The couples who lived in Java Bali islands were more likely to discuss family planning (OR= 1.5; 95% CI=1.4-1.8) than those couples lived in outer Java Bali islands. The wife's educational level strongly increases communication on family planning, and it was consistent with previous research.<sup>21</sup> The odds ratio of spousal communication increased with the increase of wife's educational level. Couples whose wives had higher education (OR=1.2; 95% CI=1.003-1.35) and secondary education (OR= 1.5; 95% CI= 1.2-1.8) had greater odds to communicate family planning than their counterparts. The likelihood of spousal communication on family planning who had married 0-4 years (OR= 1.5; 95% CI, 1.3-1.5) and 5-14 years (OR=1.6; 95% CI= 1.4-1.9) were higher than those who had married more than 15 years. The couple whose husband's reported using contraceptive were 0.6 more likely to communicate family planning than those whose couple whose husbands' not reported using any contraceptive methods.

## DISCUSSION

This study examined patterns and determinants of family planning communication between husbands and wives in Indonesia based on the 2012 Demographic and Health Survey (DHS).

Compared with the couple living outside of Java Bali islands, the couples living in Java Bali islands were more likely to discuss family planning with their spouses. This is because the initial program of family planning had been promoted in Java Bali islands, therefore, the information and services on family planning in those areas had been spread out rapidly than the outer Java Bali islands.<sup>22-24</sup>

The higher educated women revealed positive effect on family planning communication between husbands and wives. The educated women are well informed about various contraceptive methods that suit for their bodies, and more openly in discussing the ideal number of children, and timing of childbearing with their husbands.<sup>25</sup> Those educated women are more conscious regarding the cost and benefit of childrearing and childbearing.<sup>26</sup>

The probabilities of spousal communication on family planning showed reserved u-curved. Couples who had married 0-4 years had lower odds ratio than couples who had married between 5 to 14 years because lower

marital duration had not yet achieved the desired family size and are not free with talking about sexual matters compared with those with longer marital duration.<sup>26</sup> Moreover, couples who had married more than 15 years tend to had lower probabilities to speak family planning because they had perception that older persons could not pregnant anymore thus there were no need to discussed family planning.<sup>27</sup>

Most studies have revealed that the frequency of spousal communication on family planning is positively associated with contraceptive adoption.<sup>28,29</sup> Spousal communications may reduce the disapproval of contraceptive or disinformation of contraception if one partner conveys a favorable attitude towards contraception. Women is also recognized as good transmitters of information about male methods to their husbands which may increase men's probabilities to initiate contraceptive use. Communication regarding desired family size may enable a couple to reach agreement about limiting fertility. Moreover, spousal communication may enable husbands and wives to exchange practical information related to contraception.<sup>21</sup> Spousal communication helps couples to be aware on each other's perspective about family size so there will be mutual understanding and decision-making process in fertility and contraceptive preferences. Spousal communication allows shared decision making and more equitable gender roles related to family planning.<sup>6</sup>

Television had been found as an effective instrument to spread information regarding family planning for both husbands and wives. The majority of households in Indonesia have television in their houses.<sup>30</sup> Television have advantages on family planning visualization by figures and sounds that make couples easier for understanding the message.<sup>17</sup> Knowledge provided by television may make people aware and initiate behavioral change but only among those couples who are already motivated to accept the contraceptive methods.<sup>29,31</sup>

## CONCLUSION

In conclusion, this study reveals that less than half of the couples discussed on family planning issues with their spouses. Findings also indicate that spousal communication on family planning is a key element of contraceptive adoption in Indonesia. Spousal communication promotes mutual agreement in the preferences of family size and contraceptive adoption among spouses.

This study has recommended that intensive effort is needed to reach the country's targeted family planning coverage by involving men in reproductive health endeavour to enhance the discussion and agreement on family planning usage, thus, family planning activities are not left solely for women. Therefore, it is mandatory to continue ongoing information as well as education through various media to increase couple's awareness on family planning.

The study has several limitations. Firstly, the 2012 Indonesia Demographic and Health Survey is a cross-sectional data that have potentially limitation on the direction of causality. Secondly, the amount of information available to measure spousal communication was inadequate because only one question available, "how often husband-wife talks about family planning in the past 12 month?"<sup>26</sup>

Policy makers should have taken for granted that women and men play the primary role in making contraceptive decision. If the policy makers neglect of men and marital interactions has hampered the ability of programs to increase contraceptive prevalence and reduce fertility rate.

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# Epidemiology Character of Tuberculosis among Internally Displaced Persons in Tikrit City

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## ABSTRACT

**Background:** Many factors may influence host susceptibility to tuberculosis (TB) infection, and increase the risk of developing the disease.

**Objective:** The present study screened the residents of seven camps to determine the prevalence of tuberculosis (TB) infection and disease among internally displaced persons residing in Tikrit city. Using a suitable questionnaire where filled for this purpose.

**Materials and Method:** The number of participant in the study was (n=164), the convenient sampling was used to choose the sample, they were 25 (15.2%) below 16 years old, while 52 (31.7%) from 16-30 years old, and 87 (53%) above 30 years. The mean age was 37

**Results:** Signs and Symptoms, were (59%) cough, (37.6%) sputum, (33.4%) coughing up blood, (40%) fever, and (35%) were fatigue and weight loss. Of these we found 56 (34.1%) case had extra pulmonary TB, the majority 24(42.9%) with plural effusion, 7(12.5%) lymph node involvement, only 4(7.1%) skeleton, and 21(37.5%) others. The prevalence of TB in 2015 was 40/100.000, while in 2016 150/100.000, and in 2017 was 193/100.000 per year compared with 62/100,000 in 2000, 74/100.000 in 2011, and 73/100,000 per year in 2012, following years of armed conflict.

**Conclusion:** Only about 69 (42%) of patients in this survey were sputum smear-positive. Around 159 (97%) of patients in the current study either cured or completed treatment (successful treatment), While 28(17%) of these was treated for second or third time, 2(1.2%) had treatment failure and one patient (0.6%) was defaulted,2(1.2%) cases has drug resistance.

**Keywords:** Tuberculosis, Epidemiology, Tikrit city, case study

## INTRODUCTION

Nearly one third of the global population i.e. two billion people are infected with *Mycobacterium tuberculosis* and at risk of developing the disease. More than eight million people develop active TB and about two millions die every year. More than 90% of global TB cases and deaths occur in the developing world mainly Asia and Africa <sup>(1)</sup>. Tuberculosis pleural effusion is the second most common extra-pulmonary manifestation of active *Mycobacterium tuberculosis* (MTB) infection after lymph node TB <sup>(2)</sup>. In 2013 alone, it is estimated that 50 million people, including both refugees and IDPs, were displaced because of violence and conflict and more than 20 million were displaced due to natural disasters <sup>(3)</sup>. Emergencies such as natural disasters, conflict-

related humanitarian crises and migration crises result in disruption of the capacity of public health systems to meet the health care needs of affected populations. Forced displacement often results in relocation to camps or other temporary settlements where risk factors such as overcrowding, malnutrition, substance abuse, social exclusion, disruption of regular health care and poor health seeking behavior make affected populations more vulnerable to TB. IOM's TB in emergencies program is based on extensive experience with TB prevention, diagnostic and treatment services under its Migration Health Assessments and Travel Health Assistance program for immigration and refugee resettlement and TB REACH programs worldwide. Guided by the World Health Organization (WHO) Global Strategy and Targets for TB Prevention, Care and Control after

2015 and the WHO End TB Strategy, IOM supports National TB Program (NTP) systems under the Ministry of Health in non-crisis and crisis situations. Activities are coordinated and consistent with national protocols and regulations to ensure accountability to national health authorities. IOM TB activities in emergencies aim to reduce avoidable morbidity and mortality through awareness, preventive and curative services in line with NTP and recognized humanitarian priorities and in close coordination with the World Health Organization and health cluster coordination mechanisms. In 2011, a total of 9,248 cases of TB were reported, giving Iraq the 8th rank among the countries belonging to the Eastern Mediterranean Region Organization (EMRO) with an incidence of 45/100,000 population and a prevalence of 74/100,000 population. In addition, in 2010, the estimates of multidrug-resistant (MDR) cases were 2.9% among new cases, and 35.8% among re-treated cases, and the estimated number of MDR cases among all incidence cases was 820 (4). According to the 2012 report of the Ministry of Health (MOH), the incidence rate of TB in Iraq was 45/100,000, with 13,860 new TB cases and 1140 of previously treated cases (5).

## PATIENT AND METHOD

A descriptive cross sectional study performed between 25<sup>th</sup> December/2017-1st March/2018 in 7 camps in Tikrit and at consultant clinic of the respiratory and chest disease in Tikrit City (Centre of Salahaddin Governorate) where the guidelines of the NTCP are followed which based on the DOTS strategy as per WHO guidelines for the management of TB patients

The data related to last three years (2015, 2016, and 2017). The number of participant in the study was (n=164), the convenient sampling was used to choose the sample. All patients had been interviewed by questionnaire contained mixed simple questions about signs, symptoms, demographic, social characteristics, and investigations.

## RESULT

According to demographic data, A total of 164 cases, they were 25 (15.2%) below 16 years old, while 52 (31.7%) from 16-30 years old, and 87 (53%) above 30 years. The mean age was 37. Their gender was 94 (57.3%) male. And 70 (42.7%) female.

Their marital status; 71 (43.3%) was married and 93 (56.7%) was unmarried. Their educational level was 98(59.7%) literate while 66 (40.3%) illiterate. Their economic state, the majority 139(84.7%) were poor and 25(15.3%) were intermediate results were given in table 1. Their residence as shown in the table (2), duration of staying in camps (months) we have large number 114(69.5%) stayed for 18 months, 40(24.4%) stayed 12months, 9(5.5%) stayed 6months, and 1(0.6%) stayed 5months. Signs and Symptoms, were (59%) cough, (37.6%) sputum, (33.4%) coughing up blood, (40%) fever, and (35%) were fatigue and weight loss. The duration of symptoms before diagnosis (weeks), One week 6(3.7%) cases, Two weeks 2(1.2%), Three weeks 1(0.6%), Four weeks 140(85.4%), Six weeks 8(4.9%), Eight weeks 5(3%), Twelve weeks 2(1.2%) (Figure 1).

Degree of relation of index case, there was 122(74.4%) unknown, while 25(15.2%) relative, 14(8.6%) house hold, and only 3(1.8%) work place.

The ways of prevention of TB, 73(44.5%) through covering mouth and nose when cough and sneeze, 64(39%) through ventilation of room, 14(8.6%) through avoiding sharing of dishes, and 13(7.9%) through good nutrition (Table 3). Regarding the investigations of sputum smear there was 69(42%) smear positive and 95(58%) smear negative. All cases with smear negative had done chest X-ray and majority of smear positive. Regarding the treatment of TB, number of cases who had duration completed or cured (success rate) was 159(97%), while 28(17%) of these was treated for second or third time, 2(1.2%) had treatment failure and one patient (0.6%) was defaulted. Only 2(1.2%) cases has drug resistance, and 162(98.8%) were susceptible (table 4)

We found 56 (34.1%) case had extra pulmonary TB, the majority 24(42.9%) with plural effusion, 7(12.5%) lymph node involvement, only 4(7.1%) skeleton, and 21(37.5%) others than. The housing condition, there was 47(28.7%) case living in one room, 93(56.7%) were living in tow rooms, and 24(14.6%) were living in three rooms.

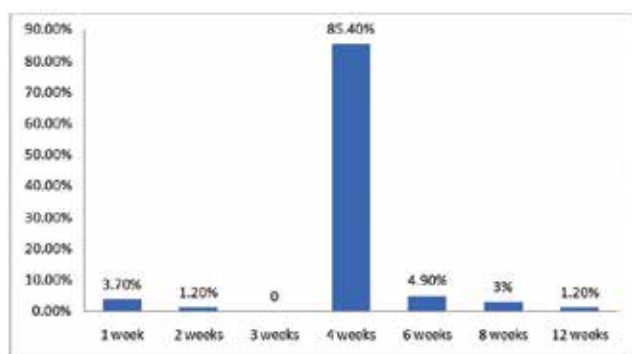
Number of family members was 10 in 107(65.2%), and 13 member in 32(19.5%), and 7 member in 16(9.8%), and 15 member in 9(5.5%). Regarding the number of windows there was 119(72.6%) has no windows, and 45(27.4%) has at least one window (table 5)

**Table 1: Different socio-demographics**

	Variety	Number	%
1.	<b>Gender</b>		
	Male	94	57.3
	Female	70	42.7
2.	<b>Marital state</b>		
	Married	71	43.3
	Unmarried	93	56.7
3.	<b>Educational level</b>		
	Literate	98	59.7
	Illiterate	66	40.3
4.	<b>Economic state</b>		
	Poor	139	84.7
	Intermediate	25	15.3

**Table 2: List of the residence of participants**

	Camp's name	Number	(%)
1.	Alam (Rubaida)	47	(28.7)
2.	Dream city	38	(23.2)
3.	Al(Souq)	23	(14)
4.	Moujamaa Qadissiya	40	(24.4)
5.	Tikrit (IDP)	13	(7.9)
6.	Moujamaa Al(Shahama)	2	(1.2)
7.	Hay Al(Qala)	1	(0.6)



**Figure 1: The duration of symptoms**

**Table 3: The ways of prevention**

Ways of prevention	Number	(%)
Through covering mouth and nose	73	(44.5)
Through ventilation of room	64	(39)
Through avoiding sharing of dishes	14	(8.6)
Through good nutrition	13	(7.9)

**Table 4: Lists treatment category**

Category	Number	(%)
Completed or cured and those whom treated for second or third time	159	(97)
Treatment failure	2	(1.2)
Defaulted	1	(0.6)
Drug resistance	2	(1.2)

**Table 5: Lists the housing conditions**

Housing conditions	Number	(%)
<b>Number of rooms:</b>		
One room	47	(28.7%)
Two rooms	93	(56.7%)
Three rooms	24	(14.6%)
<b>Number of family members:</b>		
Seven persons	16	(9.8%)
Ten persons	107	(65.2%)
Thirteen persons	32	(19.5%)
Fifteen persons	9	(5.5%)
<b>Number of windows:</b>		
No windows	119	(72.6%)
Windows are present	45	(27.4%)

## DISCUSSION

Tuberculosis has re-emerged as a serious public health problem, with increasing rates of tuberculosis disease in Iraq over the past decade. The number of people displaced and moving to the areas of Samara from Tikrit and Daur, Salahadd in governorate has reached 28,000. We found a high prevalence of active tuberculosis in the last three years (2015, 2016, and 2017) among internally displaced persons living in refugee camps in Tikrit. The prevalence of TB in 2015 was 40/100.000, while in 2016 150/100.000, and in 2017 was 193/100.000 per year compared with 62/100,000 in 2000, 74/100.000 in 2011, and 73/100,000 in 2012, following years of armed conflict<sup>[6],[7]</sup>. In general TB is more frequent among male patients 94 (57.3%) versus female patients 70 (42.7%), and this agree with Marzook and Hashim DS, and Liberato I R et al.<sup>[8], [9]</sup>

Gender differentials exist in reporting and diagnosing of TB cases, and passive case finding likely leads to failure to diagnose TB in women. The stigma associated with TB causes women to be divorced or to

be unlikely to become married. A study in India found that male patients with TB expected their wives to take care of them but infected wives rarely received care. Thus, married women may try to hide their symptoms instead of seeking help. <sup>[10]</sup>

The age distribution showed an increase in numbers of cases in age 21-40 years old and those between 41-60 years old (34.7% and 26.7% respectively) and this agrees with Al-Sulaimaniya study while Aleppo study shows increase in numbers of children under 10 years old which was (25.9%) and agrees in those between 21-40 years old which was (34.8%) <sup>[11][12]</sup>

The economic state, the majority 139(84.7%) were poor and 25(15.3%) were intermediate, and this is agreeing with study in New York City which reveals an association between poverty and TB is well documented-<sup>[13,14]</sup>. In relation to signs and symptoms, the most common were cough(59%), sputum (37.6%), coughing up blood (33.4%), fever (40%), fatigue and weight loss(35%). The classic symptoms used in the simple case definition of TB (cough, fever and weight loss) were present in 31% of all cases and 45% of cases with pulmonary TB.

The ways of prevention of TB, 73(44.5%) through covering mouth and nose when cough and sneeze, 64(39%) through ventilation of room, 14(8.6%) through avoiding sharing of dishes, and 13(7.9%) through good nutrition. We had lower practice in comparison to survey of South African metropolitan over two-thirds (68.4%) of patients reported good TB infection control practices, such as covering the mouth and nose with tissues when sneezing, disposing of used tissues in waste bins or washing of hands after contact with respiratory secretions, whether at home, at work, or in the PHC facility <sup>[15]</sup>. Only about 69 (42%) of patients in this survey were sputum smear-positive. This indicates that the diagnostic capacity of the program needs further work through training, provision of better materials and equipment, in addition to inclusion of other diagnostic methods, e.g. culture services. Our sputum smear positivity rate was similar to previous study Salahaddin which was 42%. Rate was lower than that reported from Sulaimaniya (45%), Spain (50.7%) and Nigeria (59.1%), culture services are limited in use because it needs prolonged duration. <sup>[16-18]</sup>

Around 159 (97%) of patients in the current study either cured or completed treatment (successful

treatment), While 28 (17%) of these was treated for second or third time, one patient (0.6%) was defaulted and 2 patients(1.2%) had treatment failure. In Sulaimaniya study there was (59%) of patients were reported as having recovered, (30%) as having completed treatment, (7%) died and (3%) defaulted <sup>[11]</sup>

There was 56 (34.1%) case had extra pulmonary TB, of them 24(42.9%) with plural effusion, 7(12.5%) lymph node involvement, only 4(7.1%) skeleton, and 21(37.5%) others rather than mentioned above. While in study in Salahaddin governorate The EPTB it affects lymph nodes in 35 case (30.4%) and this is higher than our study and mostly due to over diagnosis and in refugee camps the patients mostly restricted in camps, and 44(38.2%) case was pleural effusion, while and bone in 5 cases (4.3%). Other sites in body affected by EPT were in 31 case (26.9%)<sup>[25]</sup>. Regarding housing condition, there was 47(28.7%) case living in one room, 93(56.7%) were living in tow rooms, and 24(14.6%) were living in three rooms.

Number of family members was 10 in 107(65.2%), and 13 member in 32(19.5%), and 7 member in 16(9.8%), and 15 member in 9(5.5%) and this agrees with Special Report of the Canadian Tuberculosis Committee that reveals in communities where persons with TB disease live, crowded housing leads to an increased risk in terms of exposure to M. tuberculosis. The risk of exposure is also increased if there is limited air movement in an enclosed space. <sup>[19-21]</sup>

## CONCLUSION

- The prevalence of TB in the province was higher in the years following of armed conflict.
- We found a high prevalence of active tuberculosis among internally displaced persons living in refugee camps in Tikrit. We should not forget the bad economic and nutritional state for these people during terrorist occupational period and inadequate with bad treatment of TB cases before liberation action.
- Displacement play a major role in the epidemiology of tuberculosis.
- Risk of infection was greatest for adults suggesting high rates of transmission among this group since their displacement

**Ethical Clearance:** All ethical considerations and obligations were duly addressed and the study was conducted after the approval of the consultant Clinic of the Respiratory and Chest Disease Centre (CRCDC) of Salahaddin Governorate, Tikrit, Iraq. Informed written consent was obtained from participants before data collection.

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**Conflict of Interest:** Nil

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# The Relation of Physical Air Quality and Occupancy Density with the Existence of *Streptococcus sp* Bacteria in Air at Sarijadi Urban Village Sub district of Bandung

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## ABSTRACT

*Streptococcus sp* beta-hemolyticus Group A is the most common bacterial cause of upper respiratory tract infections, namely pharyngitis. The case of pharyngitis in the world because of this bacteria reaches 616 million cases each year, One of the high-potency spaces for the presence of *Streptococcus sp* bacteria in the air is a flat, because of the same building area and building characteristics as well as susceptible to the occurrence of indoor air pollution. The purpose of this study was to determine the relationship between physical air quality and occupancy density with the presence of *Streptococcus sp* bacteria in the air.

The type of research is observational analytical with cross sectional approach. The sampling technique is purposely conducted by Purposive Random Sampling with the criterion of permanent residents for 5 years and status as citizens of Bandung. Population in this research is all residential unit on long block type Flat D Sarijadi Flats. Analysis of data using univariate analysis, and bivariate analysis using correlation test.

The total of identified *Streptococcus sp* bacteria ranged from 4 CFU/m<sup>3</sup> – 38 CFU/m<sup>3</sup> to an average of 18.92 CFU/m<sup>3</sup>. The results showed that there was a correlation between indoor humidity level (p value=0,000), natural lighting intensity (p value=0,004), and number of occupants (p value=0,042) and no relation between room temperature level (p value=0,327), and respondent behavior (p value = 0,212) with presence of *Streptococcus sp* bacteria in air at Sarijadi Village Flats.

**Keywords:** *Physical Air Quality, Indoor air quality, Occupancy Density, Streptococcus sp, Flats*

## INTRODUCTION

Air quality in a room is air inside a building that is inhabited or occupied for a period of at least 1 hour by people with a variety of different health conditions. According to the Environmental Protection Agency of America (EPA), placing indoor pollution in the order of three environmental factors is risky to human health, with indoor air quality 2-5 times worse than outdoor air<sup>(1)</sup>.

The emergence of problems that interfere with indoor air quality is generally caused by several things, namely lack of air ventilation (52%), the presence of sources of contamination in the room (16%) contamination from outdoors (10%), microbes (5%), material buildings (4%), others (13%) CDC-NIOSH (National *Institute of Occupational Safety and Health*)<sup>(2)</sup>.

Air in a closed room contains fewer bacteria of the same type than those found in the open air. The bacteria are mostly saprophytes and are non-pathogenic, but with the addition of non-pathogenic bacteria in relatively large amounts can be potentially the same as pathogenic bacteria<sup>(3)</sup>. At first the air rarely contained pathogenic bacteria, but in its later development became the target of transmission of a number of major species which caused infection in the respiratory tract<sup>(4)</sup>. The presence

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of bio-aerosols in the air in the house (indoor air) can threaten the health of its inhabitants because some microorganisms can be pathogenic and cause disease in humans if inhaled or contaminate the air in the house.

One of the pathogenic bacteria is *Streptococcus*. *Streptococcus sp* beta-hemolyticus Group A is a normal flora in the human throat. As many as less than 10% of humans have these bacteria as upper respiratory tract commensal bacteria<sup>(5-6)</sup>. These bacteria easily spread in dense residential environments. Bacteria are also more spread at the turn of the season and in the rainy season. Bacteria spread through the air, transmitted through nasal mucus, for example through spitting of saliva when talking, coughing, or sneezing<sup>(7)</sup>.

One of the rooms with high potential for the presence of *Streptococcus sp* bacteria in the air in the room is the flats. Because in the room with an area of 36m<sup>2</sup>, inhabited by more than 4 people, there are many household appliances, the walls of each wall are plywood. In addition, the construction of the flats is inadequate, such as setting up a room ventilation system. Such conditions will make the concentration of dust in the room. Together with these dusts is *Streptococcus sp*, which is one type of microbial pollutant in the air that is often associated with the incidence of pain in humans. Health problems caused by fungi in the house are used by people who have activities inside.

**MATERIAL AND METHOD**

This study uses an observational analytic research design using a cross sectional approach. In this study independent variables and dependent variables were assessed simultaneously with measurements at one

time. The population in this study were all residential units at Flat D in Sarijadi Flat, Bandung City. Sampling Technique was carried out by purposive sampling with consideration of the occupants of the flat units who were willing to be made as respondents by the criteria: recorded as residents of Sarijadi flats, residing or settling down for a minimum of 5 years and functioning all rooms inside the house<sup>(8-9)</sup>.

Measurement of physical air quality is carried out using a room temperature and humidity measuring device as well as lighting intensity measurement devices in the room. The total assessment of *Streptococcus sp* bacteria is carried out by bacterial isolation or culture using blood agar media or blood agar plate, where the airborne samples are taken using a Microbial Air Sample. Occupancy density is assessed by observing using a questionnaire about the number of permanent residents who live in the residential unit. Respondent’s behavior was assessed by observing or observing respondents’ behavior using questionnaires related to microbes in the air such as routine cleaning of the house and furniture, routine cleaning of windows and ventilation.

**RESULTS AND DISCUSSION**

**Research Location:** Sarijadi Village is part of Sukasari District, Bandung City which is included in the Bojonagara development area. Has an area of 157.06 Ha. Sarijadi Village consists of 11 RWs and 100 RTs.

The population of Sarijadi Village reaches 24,485 people with a population density of around 155.9 people/ Ha. The Sarijadi Flats complex consists of two different types of residential blocks, namely 11 Long Type Blocks built on the east and 5 Short Type Blocks built on the west with different types of time structures.

**Univariate and Bivariate Analysis**

**Table 1: Descriptive Variable Test Results**

No.	Variable	Min	Max	Mean	SD
1.	Level of Room Temperature( <sup>0</sup> C)	28.1	31.0	29.33	± 0.87
2.	Level of Room Humidity (%)	51.0	71.8	59.33	± 5.87
3.	Natural Lighting Intensity (lux)	8.0	528.0	238.1	± 156.6
4.	Occupancy Density	2	5	3.29	1.04
5.	Respondent Behavior (%)	22.2	88.9	64.83	± 16.29
6.	<i>Streptococcus sp</i> colonies (CFU/m <sup>3</sup> )	4	38	18.92	± 8.4

**Table 2: Recapitulation using Correlation Test Relationship between Physical Air Quality, Occupancy Density, and Respondent Behavior Score with the Presence of Streptococcus sp Bacteria in the Air**

No.	Variable	p-value	R	Direction of Relationship	Information
1.	The relation of total <i>Streptococcus sp</i> with room temperature level	0,327	0,209	Positive	Not significant
2.	Relation of Total <i>Streptococcus sp</i> with Room Humidity Level	0,000	0,763	Positive	Significant
3.	Relation of Total <i>Streptococcus sp</i> with Natural Lighting Intensity	0,004	-0,568	Negative	Significant
4.	Relation of Total <i>Streptococcus sp</i> with Occupancy Density	0,042	0,417	Positive	Significant
5.	The relation between total <i>Streptococcus sp</i> and Respondent Behavior	0,212	-0,264	Negative	Not significant

**The relation of total *Streptococcus sp* with room temperature level:** Variations in the level of air temperature obtained when the measurement and total variation of *Streptococcus sp* bacteria do not show a significant difference or direction of the relationship that is directly proportional, this is due to the air temperature values obtained below the optimum temperature for the proliferation of *Streptococcus sp* bacteria and other environmental factors that affect such media or particles attached to bacteria such as dust and water particles. Like the situation in the field which states that the temperature is optimum enough for the proliferation of *Streptococcus sp* bacteria but low humidity below 85% indicates that the media of water particles that are attached to the bacteria are less than the room which has humidity above 85%.

The results of this study are not aligned with the research conducted by Wulandari (2013) which states that there is a significant relationship between room temperature and the presence of *Streptococcus sp* in the air, but the results of this study are consistent with Aris (2011) research which states that there is no meaningful relationship between room temperature and pathogenic bacteria that cause pneumonia in toddlers<sup>(10-11)</sup>.

**Relation of Total *Streptococcus sp* with Room Humidity Level:** The relationship between humidity and the presence of *Streptococcus sp* bacteria is caused by several houses that have little chance of sunlight entering the house such as houses on the ground floor and the behavior of respondents who rarely open windows and ventilation is permanently closed so that air circulation does not run well and levels water in the air or moisture is concentrated in the room, causing the

growth of bacteria in the air to increase because the humidity of the room becomes an ideal environmental factor for the proliferation of bacteria.

The results of this study are in line with the research conducted by Wulandari (2013) which states that there is a significant relationship between room air humidity and the presence of *Streptococcus sp* bacteria in the air, and research conducted by Mareta (2013) which states that there is a significant relationship between air humidity and bacteria that cause tuberculosis, as well as research by Kamila (2016) which states that there is a significant relationship between air humidity and the number of bacterial colonies in the air<sup>(10-12)</sup>.

**Relation of Total *Streptococcus sp* with Natural Lighting Intensity:** The results of the lighting measurements at the flats' residential units showed a value of 8 lux - 258 lux where several houses had natural lighting intensity below the minimum quality standards set based on Regulation No. 1077 of 2011 which states that the minimum lighting is 60 lux.

In general, microorganism cells are damaged by light, especially in microbes that do not have photosynthetic pigments. Shortwave rays will adversely affect microbes. While the light with long waves has photodynamic power and biophysical power, such as sunlight. When the energy of radiation absorbed by microorganism cells will cause ionization of cell components so that it will inhibit the growth and metabolism of cells<sup>(13)</sup>.

The tendency of more residential units to enter the sun at houses on the upper floors is supported by the habit of homeowners who often open their windows and



doors to reduce humidity caused by leakage of house construction above it so that sunlight entering the house greatly influences the survival of *Streptococcus sp* in the room air in the house.

This is consistent with research conducted by Wulandari (2013) which states that there is a significant relationship between natural lighting intensity and the presence of *Streptococcus sp* bacteria in the air, and research by Mareta (2013) which states that there is a significant relationship between the intensity of natural lighting with pathogenic bacteria causes of tuberculosis, as well as research by Kamila (2016) which states that there is a significant relationship between the intensity of natural lighting and the number of bacterial colonies in the air<sup>(10, 12)</sup>.

**Relation of Total *Streptococcus sp* with Occupancy Density:** A narrow building with a suitable number of occupants will reduce the reduction of O<sub>2</sub> in the room so there is no increase in CO<sub>2</sub>. If CO<sub>2</sub> levels increase, there will be a decrease in indoor air quality. Because basically organisms that take their energy by photosynthesis or by oxidizing inorganic compounds can use CO<sub>2</sub> as the main carbon source. Bedrooms that are less than 8m<sup>2</sup> in size and inhabited by more than 2 people can increase CO<sub>2</sub> levels in the air and can increase the proliferation of pathogenic bacteria in the air and one of them is *Streptococcus sp*.

This is not in line with the research by Wulandari (2013) which states that there is no relationship between the density of occupancy with the presence of *Streptococcus sp* in the air, but this study is in line with the research by Mareta (2013) which states that there is no significant relationship between density occupancy with pathogenic bacteria that cause tuberculosis disease<sup>(10, 12)</sup>.

**The relation between total *Streptococcus sp* and Respondent Behavior:** Adequate room cleanliness of the environment will be maintained and will reduce the risk of *Streptococcus sp* in the air. But if the room sanitation is bad, it will cause the room to become dirty and dusty. Dust that sticks to the furniture and carpet will make the air inside it moister. If the humid air will cause an increase in temperature in the room and the condition of this humid and high temperature room, *Streptococcus sp* and other bacteria can multiply<sup>(14)</sup>

The insignificant relationship was caused by the score of the behavior of respondents with the total

number of *Streptococcus sp* bacteria in the air which did not have a significant difference. The average respondent has a good behavior score and respondents who have bad behavior tend to have the same bad habits as never cleaning windows and ventilation and rarely cleaning carpets. If the respondent's behavior is bad and at risk of increasing the concentration of dust particles in the air where dust becomes one of the media that is attached to bacteria, it is likely that the bacterial media to breed become many, but the proliferation of bacteria is strongly influenced by environmental factors such as temperature, humidity and lighting, size and specific gravity of dust particles also affects the length of time the bacteria are in the air. If the media attached to the bacteria has a size of > 5 microns, the media and bacteria will fall down and the bacteria will not last long on the floor because the respondent has a habit of cleaning the floor using disinfectants that can kill bacteria so even though the respondent has habits that can increase dust concentration in the air, Other factors can cause bacteria to not survive long in the air if the environmental factors are not optimum for bacteria to grow and multiply.

This is not in line with the research by Wulandari (2013) which states that there is a significant relationship between respondents' behavior in terms of room sanitation and the presence of *Streptococcus* bacteria in the air<sup>(10, 15-16)</sup>.

## CONCLUSION

- a. There is no relationship between the levels of room temperature and respondent behavioral score with the presence of *Streptococcus sp* bacteria in the air in the residential unit of the Sarijadi Village, Bandung City, with a p value > 0.05.
- b. There is a relationship between the level of air humidity in the room, natural lighting intensity, the number of occupants of the house with the presence of *Streptococcus sp* bacteria in the air in the residential unit of the Sarijadi Village, Bandung City, with a p value < 0.05.

**Conflict of Interest:** The authors have no conflicts of interest to declare

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# The Policy of Reproductive Health Education for the Adolescence with Intellectual Disability in Indonesia: A Qualitative Study

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## ABSTRACT

Adolescence with disabilities are one of Indonesia's human resources whose quality must be improved to make them play the role as the subjects in health development. The result of the National Socio-Economic Survey in 2012 shows that there are 2.45% of Indonesian people are disabilities. According to the Social Protection Program (PPLS) in 2012, the number of people with disabilities is 3,838,985. This research was a qualitative research with case study design carried out in June - July 2018. The total informants were 27 people coming from different stakeholders related to the reproductive health education for young people with mental retardation. The results of this study show that not all of the relevant stakeholders formulate the policies regarding the reproductive health education for young people with mental retardation. It is only the Ministry of Education and Culture that has formulated a specific policy in the form of reproductive health guidelines for adolescence with intellectual disability. The implementation of these policies is not optimal and is expected to be included in the special education curriculum.

**Keywords:** Education, Mental Retardation, Reproductive Health, Adolescence

## INTRODUCTION

Teenagers with disabilities have the same tendency as normal young people in doing the risky sexual behavior.<sup>1</sup>The research carried out in the Special Junior High School and Special Senior High School in East Jakarta in 2013 showed that 69.5% of students have risky sexual behaviors such as kissing on the cheeks, masturbation, and others.<sup>2</sup>

The reproductive health will affect the children's lives in the future including the children with disabilities who need special treatment and control.<sup>3</sup>There is a commitment to uphold the Convention on the Children's Rights (KHA) and the Convention on the Rights of People with Disabilities (KHPD) which demands the governments around the world to be responsible in ensuring that the

children with disabilities have the equal rights as other children including the right to obtain information related to reproductive health.<sup>4</sup> In order to realize these demands, a public policy of reproductive health is required for the young people with intellectual disabilities.

Based on the above-mentioned statement, the researchers attempted to examine the extent to which reproductive health education policy for young people with mental retardation in Indonesia.

## MATERIALS AND METHOD

This research was a qualitative study using case study design on reproductive health education policy for young people with disabilities. The design of this study was chosen to obtain the immediate and in-depth information related to the reproductive health education policy for young people with mental disabilities; therefore, they can obtain in-depth information.

This research was carried out in 2 months from June to July 2018 consisting of data collection, data processing and analysis, and research activities evaluation stages. In

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qualitative study, the informants are determined based on the principle of appropriateness and adequacy. The informants in this study were:

1. Government Agencies from the Ministry of Health, Ministry of Education and Culture, Ministry of Women's Empowerment and Child Protection, and the Ministry of Social Affairs.
2. Implementers of Teachers or the educators in Special School
3. Other related stakeholders, such as NGOs (Advocacy center for Women with Disabilities and Children/SAPDA) and Rutgers WPF)

## RESULTS

**Knowledge and Perception:** Most of the key informants have good knowledge about the reproductive health of young people with mental retardation. From the aspect of reproductive health, it was explained that those related to reproductive health are things related to sexual organs, hormonal changes, puberty signs, and so on.

The stakeholders' views related to the urgency of the government in formulating the policies about reproductive health education for young people with mental retardation is that reproductive health education policies for young people with mental retardation are essential and necessary to be made. The informant explained that there were many problems related to reproductive health that occurred due to the lack of knowledge and information of the teachers, parents, and young people with mental retardation. The teachers in special schools have not yet carried out the routine programs related to the reproductive health because they were not in the special education curriculum.

**Agenda Setting Stage:** The agenda setting is the first stage in preparing the policy. In this stage, an effort to raise the problem to the public was done to make this issue to be considered as the important problem that requires the action of public policy. The implementation of agenda setting was carried out by the stakeholders who have an interest in the issue of reproductive health education of young people with mental retardation. All of the key informants have duties and functions related to young people with mental retardation including their reproductive health problems.

**Policy Formulation Stage:** The policy formulation stage includes informant activities in designing relevant

actions (policies) to overcome the problems related to reproductive health education of young people with mental retardation.

Some informants have carried out the policies formulations related to the reproductive health education of young people with mental retardation, even though not all of them are specifically designing the reproductive health education policies of young people with mental retardation.

**Policy Adoption Stage:** The policy adoption referred in this study is the informants' activities in adopting policies related to the reproductive health education of young people with mental retardation including the initial step in informing the policies and implementing the policy socialization. Most of the informants have carried out the policy adoption stage.

**Advocacy:** Advocacy has various meanings. Advocacy is an effort or a process to obtain the commitments made persuasively by using accurate and precise information. All of the informants stated that advocacy is an important stage in formulating policies. Advocacy is conducted to get the superior's support as well as the budget support.

**Policy Implementation Phase:** Aspects of policy implementation include informant activities in realizing the goals of reproductive health education policy for young people with mental retardation that has previously been declared. In the implementation stage, there are 3 aspects that were examined, namely the program, objectives, and impacts. This stage needs to be well-prepared in the stage of formulation and policy making.

**Policy Assessment Stage:** The policy assessment stage is the final stage of policy formulation. At the policy assessment stage, monitoring and evaluation were conducted to find out the extent to which the policy has been implemented. The formulation of the specific reproductive health education policy for young people with mental retardation was carried out only by the Ministry of Education and Culture in the form of reproductive health guidelines for mental retardation.

## DISCUSSION

**Knowledge and Perception:** Good knowledge from the informants would certainly influence their behavior in arranging the formulation as an intervention in overcoming the problem. It is based on the theory of

knowledge which states that one level in knowledge is a synthesis process in which one will form new formulations of pre-existing formulations at this stage.<sup>5</sup> Perception is one's view at an event that is formed by one's hopes and experiences.<sup>6</sup> When the perception is formed, a person's behavior will be determined which leads to the interpretation of the reality.<sup>7</sup> Rushbrooke, Craig, & Samantha also state that positive perception will encourage oneself to sexuality education for young people with mental retardation.<sup>8</sup>

**Agenda Setting Stage:** The policy preparation process is a complex thing that involves many processes and variables that must be studied. There are 5 stages in the public policy preparation,<sup>9</sup> namely the preparation of policy agendas, policy formulation, policy adoption, policy implementation, and policy assessment or often referred as policy evaluation stages. The first stage in the policies formulation is agenda-setting. It becomes a key step that must be passed in order to put the problem in the government's agenda.

According to Barbara Nelson, the definition of an agenda-setting is the government activities in learning new things, deciding to pay attention, and mobilizing organizations to respond. All informants have formulated the problems that are associated with reproductive health education of young people with mental retardation although it is not specific. Public policy is formulated as a decision that is aimed to resolve particular problems through certain efforts in order to achieve certain objectives carried out by the government agency having the authority to carry out nation duties for the development of the nation.<sup>10</sup>

**Policy Formulation Stage:** One of the important things in the public policy cycle is the arrangement or formulation of the policies. At this stage, the policy analysts frequently find it difficult to propose a policy plan that can overcome the public problems that currently occurred. The Ministry of Health has prepared the Guidelines for the Implementation of Reproductive Health Services for Adults with Disabilities and the Draft of Minister of Health regarding to the Functional Disorders Control. Meanwhile, the Ministry of Education and Culture has compiled the Reproductive Health Guidelines for young people with mental for teachers and parents. The Ministry of Social Affairs has also compiled guidelines, namely the guidelines for the persons with intellectual Disability Persons with Social Rehabilitation although it does not specifically address the reproductive health of retardation.

So far, only the Ministry of Education and Culture that has been assisted by Rutgers WPF, which has formulated the policies related to the reproductive health education of mental retardation in the form of manuals. Meanwhile, the SAPDA institution in Yogyakarta has also compiled a Guide to Sexual and Reproductive Health for young people with mental retardation.

**Policy Adoption Phase:** In the early stages of adoption, a policy is chosen as a solution to the public problems that occurred. Of the many policy alternatives shown by policymakers, in the end, one of those policy alternatives was adopted.<sup>9</sup>

The aspect of this stage is the availability of the socialization as the initial step in policy adaptation. Based on the interview, it can be known that all of the informants conducted the socialization as the introduction of the policy to the target.

**Advocacy:** Advocacy is important in developing public policy. It is consistent with the results of the research conducted by CempakaRini<sup>11</sup> which states that advocacy will arouse the stakeholder awareness to pay attention to the health problems of young people with intellectual disability.

The reproductive health program for young people with intellectual disabilities is very important since everyone has the equal rights related to his or her health. It is in line with the research conducted by Kucuk, Nurgun, & Emine showing that young people with mental retardation who were given the sexual education have the effort to have high self-protection against sexual abuses.<sup>12</sup>

**Policy Implementation Phase:** The policies that have been formulated will not succeed if the policy implementation stage is not carried out properly. Based on the information obtained through in-depth interviews, it is known that the government (in this case is the Ministry of Education and Culture) has compiled a Reproductive Health Education Policy on Young People with Mental Retardation in the form of guidelines. The implementation of its policies is by conducting trials, training for teachers, and providing assistive devices such as videos. Before the guidelines were established, the reproductive health material is only provided incidentally if the cases occurred at school. The results of the study state that sexuality education is not included in the Special Education (PLB) curriculum.<sup>14</sup>

According to Jannah's research, sexuality education in SLB Yogyakarta is only given incidentally, because schools do not have a curriculum on sexuality education.<sup>15</sup> Thus, the teachers do not have guidelines in providing sexuality education to children. Based on the above-mentioned statement, it will be very important to make reproductive health education into the special school curriculum. According to Taiwo, the government is responsible for developing sexual education for special schools.<sup>16</sup>

**Policy Assessment Stage:** In the policy assessment phase, monitoring and evaluation of policy implementation must be carried out. According to the information from the Ministry of Education and Culture (as the only government stakeholder who has formulated policies related to reproductive health education specifically), evaluation activities have not been carried out as the implementation has not been finished.

Special reproductive health modules or guidelines for young people with mental retardation will make the implementation run more systematic and directed. According to UNESCO, a teacher may experience several conflicts while delivering sexuality education. Some teachers may be less confident and confused when experiencing the issues related to sexuality. Insecurity arises since there are no manuals or guidelines which are related to reproductive health in order to explain it to the students with mental retardation. Therefore, teachers really need guidelines to provide a clear overview of what to teach and how to teach it.<sup>16</sup>

In addition to the need for reproductive health manuals or guidelines, a curriculum related to the reproductive health in special education is also required. Reproductive health education has not yet become a separated curriculum or has not been included in the special education curriculum in Indonesia. Its implementation, up to this time, is done by integrating several related subjects such as Biology, Science, or Physical Education. The results of this study are in line with the previous studies in which the material related to sexuality and reproductive health in schools is usually given in science, religion, and physical education subjects.<sup>17</sup>

At the end of this research, the recommendations that need to be conveyed to the stakeholders as policymakers are to be able to incorporate reproductive health education for young people with mental

retardation into the special education curriculum. Thus, the implementation will later be more systematic. Taiwo states that a separated curriculum on reproductive health is needed in the educational curriculum of children with disabilities.<sup>16</sup>

## CONCLUSION

1. The policy on reproductive health education has been made by several relevant stakeholders, such as the Ministry of Health, the Ministry of Social Affairs and the Ministry of Education and Culture although it is specifically discussing reproductive health issues.
2. The Ministry of Education and Culture has formulated the reproductive health guidelines for people with mental disabilities that are expected to become a guide for special school teachers and parents in providing the reproductive health education for young people with mental retardation in all provinces in Indonesia.
3. The content of reproductive health in young people with mental retardation is expected to be included in the special education curriculum to optimize the implementation process.

**Conflict of Interest:** There was no conflict of interest of this study

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**Ethical Clearance:** Ethical review was conducted in accordance with the procedures at the Faculty of Public Health of the Universitas Indonesia and was approved by the Health Research Ethics Committee of the Faculty of Public Health of the Universitas Indonesia

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# Artificial UV Radiations Emitted from Different Types of Lamps

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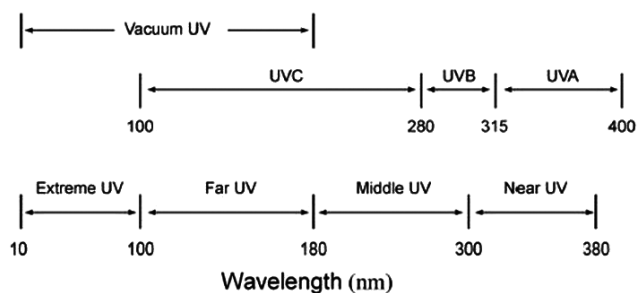
## ABSTRACT

UV-rays produced in two ways natural and artificial; there are some difficulties in determined the first because it created from the sun in various types of UV-rays therefor it's not easy to study its effects on human body. In the present study selected a different lamps (18,40,60) watts and also a halogen lamp used in the thermodynamic Laboratory in physic department , college of science university of kerbala to calculate the intensity of emitted rays and determined the wavelength of radiation from its lamps in any region of UV-rays. The results show that the radiation is located within regions of ultraviolet rays, according to the radiated intensities and wave length from spectra of the lamps. The conclusion can be explained that the lamps emit ultraviolet radiation; so that they pose a health hazard to the population.

**Keywords:** Electromagnetic spectrum, Artificial UV Radiation, Ultraviolet (UV) Light Spectrum, emission of UVA and UVB rays by lamps.

## INTRODUCTION

UV is the short wavelength radiation and the most energy of non-ionizing radiation in the electromagnetic spectrum lies within the wavelength range (100 - 400 nm) see Figure 1. The short wavelength of the UV region is often taken as a boundary between the ionizing radiations spectrum that its wavelengths less than 100 nm and the non-ionizing spectrum that its wave length larger than 400nm. UV can be classified into three regions UVA (315 - 400 nm), UVB (280 - 315 nm) and UVC (100 - 280 nm) regions



**Fig. 1: Ultraviolet (UV) regions of the electromagnetic spectrum**

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Exposure to UV radiation occurs from natural and artificial sources. The sun is the main source of exposure for most people. Solar UV is subject to large absorption of the atmosphere. With the depletion of the stratospheric ozone layer, the environment will be exposed to higher ultraviolet radiation. A fluorescent lamp is a gas discharge source that contains mercury vapor at low pressure, with a small amount of inert gas to start up. Once the arc is created, mercury vapor is emitted from ultraviolet radiation. Fluorescent Powder (Phosphor) Interior Wall Paint The glass bulb responds to this ultraviolet radiation. It is generally believed that the long UV effects on human skin are harmless. Responses to UVA alone, UVA plus sunlight, sunburn, and single sunburn radiation were evaluated both clinically and microscopic, the results showed that there were no effects on the skin but the effect on DNA metabolism occurs <sup>[1]</sup>. The distribution of the spectral power SPD, used to compare the light emitted by the flaming wick, has a smooth continuous SPD across the visible spectrum, and the light from a fluorescent lamp has a low-level SPD with separate screws at specific wavelengths. The light emitted by the LED is distributed smoothly but in a narrow area near one wavelength. The type of gas discharge of the lamp is classified into two sets of high or low pressure. Low pressure gas discharge sources are low-pressure sodium fluorescent lamps and Mercury vapor. High pressure gas discharge sources are sodium lamps and halogen



lamp<sup>[2]</sup>. A study examining the emission of UVA and UVB radiation by lamps and electronic screens has been measured to determine the safe distance between the emitted source and the individual. The conclusion that lamps and electronic devices does not emit ultraviolet light, so as not to pose a health hazard to the population<sup>[3]</sup>. Lamps are studied and their applications; a lamp is a device that produces visible light due to the flow of electric current. It is the most common form of artificial lighting and is essential for modern society, providing interior lighting for buildings and outdoor light for evening and night activities. Types of lamps also have many applications in various sciences. Fluorescent lamps are a special class of gas discharge lamps where the electricity often produces an invisible UV light that turns into visible light by a special phosphoric coating on the inner part of the tube<sup>[4]</sup>. The effects of artificial light exposure on insect behavior were studied. The ultraviolet component of artificial lighting can greatly reduce its attractiveness, providing a powerful ability to control the impact on insects. Traditionally, the gravity of an insect lamp is calculated using a luminous efficiency spectrum of insect rhodopsin. This has enabled the development of lamps emitted by radiation with less visible wavelengths for insects (i.e., yellow lamps). After testing the number of insects attracted to the lamp is disproportionately affected by the emission of ultraviolet radiation. UV radiation stimulates the approach to light independently of the amount of UV radiation emitted. Thus, even small amounts of ultraviolet radiation should be controlled in order to develop bug-free lamps<sup>[5]</sup>. UV exposure is one of the most important environmental health risks, which clearly explains age-related skin changes such as wrinkles, melanomas, laminations and carcinogenesis due to complex societal factors such as professional and recreational activities. New methods are designed to exploit these signaling pathways to delay or even prevent the symptoms of free radical radicalization of aging using natural extracts<sup>[6]</sup>. The fundamental objective of this work is to investigate the emission of artificial UV-Radiation from lighting lamps, UV-VIS Spectroscopy and Spectra wiz program are used to determine the type of UV accompanied with radiations of lamps, The testing contains lamps of different power working under the electric discharge phenomena, also used a halogen lamp in testing. In this work the distance between source(lamps) and the sensor is constant because the effects of electromagnetic radiation depend on the distance between source and target according to inverse-square law.

**Gas discharge lamps:** The principle of the gas discharge lamp depends on the conversion of electrical energy into radiation by an electric discharge in the gas in the lamp. In these lamps the plasma is created weak or moderately moderate. Plasma is ionized gas consisting of electrons, ions and neutrality. In general, gas is found in a discharge tube with two electrodes; after the plasma is created the UV probe is investigated. Lighting lamps produce light by passing the electric current through a gas that emits light when ionizing from the current. Two general categories of discharge lamps are used to provide illumination: high intensity discharge and fluorescent lamps. High-pressure mercury vapor lamps and high-pressure sodium lamps are produced by electrical discharge, the first by electrical discharge through gaseous mercury and the second by common vapors of mercury and sodium, mercury, usually with argon gas, contained within the quartz arc tube, which surrounds .It has an external bulb of borosilicate glass. Xenon lamps do not contain mercury vapor. They contain xenon gas, kept in the pressure of many atmospheres. Xenon lamps are available in panels from 5 to 32000 watts. Fluorescent lamp is a gas discharge source containing mercury vapor at low pressure, with a small amount of inert gas to start. Once the arc is created, mercury vapor is emitted from ultraviolet radiation. Fluorescent powders that cover the inner walls of the glass bulb respond to this ultraviolet radiation by transmitting the wavelengths in the visible region of the spectrum. In a glass tube, a small drop of mercury is placed and a small amount of argon gas to start discharge. The pressure, voltage and current are adjusted until 253.7 nm lines are stimulated. This re-radiates the longer wavelength. Typically a 40W lamp requires 2-3g of phosphorus. The maximum sensitivity is about 250 - 260 nm<sup>[7]</sup>.

However, predilection of the emissions and risk of mercury from fluorescent lamps reported by<sup>[8]</sup> to both humans and the environment during the production and disposal, mercury was highly toxic mercury binds to cell walls or microorganisms .The basic process that occurs in the discharge can be described as the electrons are accelerated by an electric field imposed from the outside. Their velocity will be scattered in random directions by a flexible and inflexible collision with heavy particles. The result of this thermal heating is high electron temperature. In the case of an inflexible collision, the kinetic energy of the electrons is converted to the inner energy of the atoms. These intrusions are essential for chemical processes, such as excitation, ionization, disintegration, and radiation generation. When the pressure is average or high (generally from hundreds of

Torr to many environments, such as HID lamps), there are enough inert gas molecules in the elastic and inelastic collisions. More energy can be transferred to the plasma gas, making the discharge near the arc discharge system, and the heat makes physical or chemical changes to halide metal or metal happen<sup>[9]</sup>.

**Experiment Part:** In this work, different lightning lambs were selected with different power (18, 40 and 60) watts to estimate ultraviolet emission. Using spectral UV spectra with Spectra wiz program to determine the spectra of the rays emitted by the lamps (see Fig. 2), the original 8 is useful in drawing the results, the spectral analysis shown in the image of peaks of colored peaks due to the difference in the wavelength of each line of the other



Fig. 2: UV-Visible Spectroscopy (SV2100, K-MAC)

This experiment can be briefly summarized as a luminance source (lamps) and a detector sensor is created in a straight line in order to reduce the dispersion of radiation at a fixed distance according to the fact that the radiation intensity of the inverse square law is adjusted (see Figure 3). The relationship between wavelength and intensity obtained using the wiz spectra and the original 8 programs after connecting the computer with the spectral analysis. The last step is the spectral analysis.



Fig. 3: Photograph of a halogen lamp experiment

The spectra of lamps with different powers (18, 40, 60) watt was determined by using the UV-Visible spectrometer (SV2100, K-MAC) referred to in Figure 2. We were able to analyze the spectrum by determining the high intensity and wavelength values of the lamps using the Origin 8 software to explain the spectrum after Spectra wiz was installed on the lap top. The spectrum shows that these lamps and a halogen lamp emit ultraviolet rays.

**RESULTS AND DISCUSSION**

It is widely known that electromagnetic radiation greatly affects living organisms, including humans. Exposure to ultraviolet radiation may be natural, artificial and for long periods have serious and chronic health effects on the skin, eye and immune system of the body, also see ref. <sup>[10]</sup>. lamps of different power produce ultraviolet radiation by ionizing mercury vapor with a low-pressure atmosphere. The phosphorus powder that encapsulates the inner part of the tube absorbs that radiation and converts it into visible light. The wavelength of the main mercury emissions is in the ultraviolet range. It is dangerous to expose the eyes or skin directly to the illumination of the mercury arc, which does not contain the converted phosphorus. Mercury illumination is often determined at wavelengths; other sources of ultraviolet light are xenon lights, deuterium, xenon-mercury lighting, metal halide lamps and finally tungsten halogen lamps. Figures (4, 5, 6 and 7) show the spectrum of lamps (18, 40 and 60) watts and halogen lamp respectively.

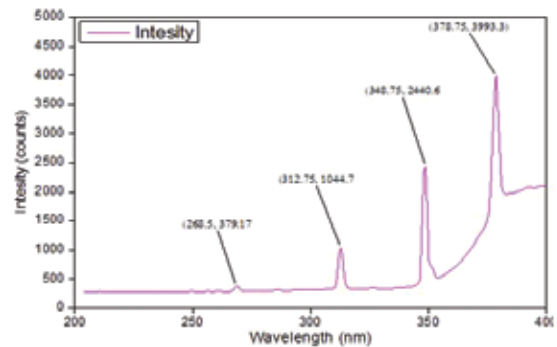


Fig. 4: Spectrum of a (18watt) lamp

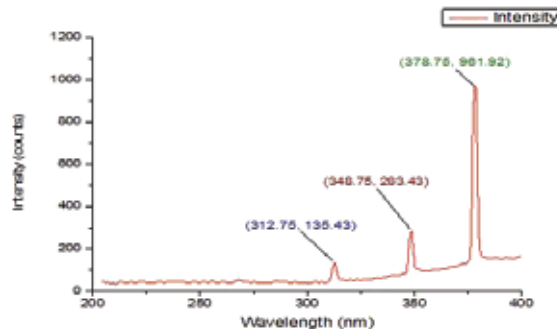


Fig. 5: Spectrum of a (40 watt) lamp

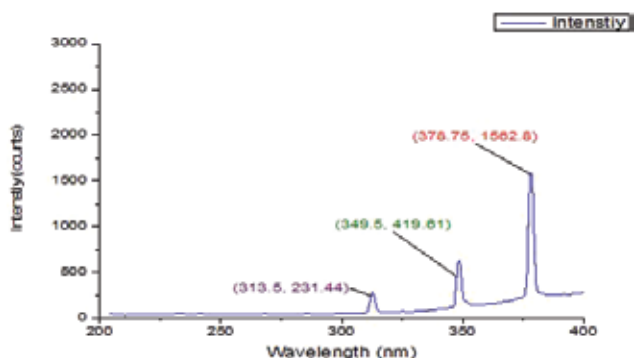


Fig. 6: Spectrum of a (60 watt) lamp

It is clear from figures (4,5, and 6) that the luminescent intensity of the lamps depends on the amount of energy it consumes. Fig.4 shows the peak intensity value (3993.3) appears at wave length 378.75 nm this means the lamp emitted UV-ray at UVA region, at the same way peak value(2440.6)at 348.75 nm but peak value (1044.7) at 312.75 nm at UVB region and (379.17)at 268.5nm at UVC region.Fig.5 and 6 illustrated all the peak intensity values Located at UVA region approximately(see the table below).

Table 1: shows the peak intensity value and wave length for different power lamps

Lamp power watt	intensity	Wave length nm	UV-region
18	3993.3	378.75	UVA
	2440.6	348.75	UVA
	1044.7	312.75	UVB
	379.17	268.5	UVC
40	961.92	378.75	UVA
	283.43	348.75	UVA
	135.43	312.75	UVB
60	1562.8	378.75	UVA
	419.61	349.5	UVA
	231.44	313.5	UVB

Table.1 shows the peak intensity value not only depends on energy consumption but also on the manufacture company such as 18 watt emitted intensity 3993.3 at wave length 378.75nm while 40 and 60 watts emitted intensity 961.92 and 1562.8 respectively at 378.75 nm

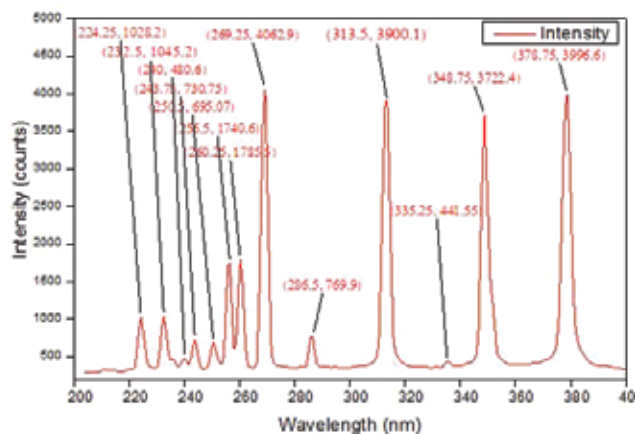


Fig. 7: Spectrum of a halogen lamp 18 watt

Spectrum of halogen lamp illustrated in fig.7 show the high peak value intensity appears at UVA region(378.75 nm) and the peak intensity value 1028.2 appears at UVC(224.25 nm), it is clear that the spectrum of halogen lamp emitted radiations at all regions of UV-ray.

### CONCLUSION

All lightning lamps emitted UV-rays at different wavelengths; the effects of UV emitted from lamps depend on the manufacture company, energy consumption, distance from source and the exposure time. Street vendors who use mobile vehicles use lamps in a manner that is not reliable in terms of the number of lamps and the distance of the source is one meter away from the seller. Students and staff at the Thermal Lab at the Physics Department of the Faculty of Science were directed not to look directly at the halogen lamp that used in the experiments of the thermal laboratory of the second stage for its effects.

**Significant Statement:** It is well known that electromagnetic radiation has an effect on humans and other living organisms, one of our radiations is ultraviolet rays, because of difficulty on measuring the ultraviolet rays coming from the sun, therefore we determine the artificial UV-rays emitted from lightening lamps which are used commonly by many people.

**Ethical Clearance:** In fact, the research was done in the laboratory of thermodynamic at Department of Physics, Faculty of Science, University of Kerbala within the plan of the annual research, the aim is to explain the effects of UV-radiation emitted from using halogen lamps on students during perform the experiments, and there is no conflict or contradiction with any government or private

sector and there was no external funding, researchers used laboratory apparatus of the College.

**Source of Funding:** Self-funding

**Conflict of Interest:** Nil

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# Accuracy of Ultrasound in Comparison to Magnetic Resonance Imaging in Diagnosis of Meniscal Tears

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## ABSTRACT

**Background:** Meniscal tears has significant impact on patients quality of life so early diagnosis by a simple cheap non invasive investigations is important.

**Objective:** To assess accuracy of ultrasound (US) in comparison to magnetic resonance imaging (MRI) in diagnosis of meniscal tears.

**Patients and Method:** This diagnostic accuracy study involved 50 patients with clinical features of meniscal tears. Ultrasound and MRI were done for each patients. US was read by a single radiologist blinded to the result of MRI and its diagnostic accuracy was measured.

**Results:** No significant difference between US and MRI in detecting meniscal tears. Diagnostic accuracy of US was 70%, sensitivity 91.4 %, specificity 20%, Positive predictive value (PPV) at pretest 50% was 53.3% and PPV at pretest 90% was 91.14% , Negative predictive value (NPV) at pretest 10% was 95.4%, Likelihood ratio positive (LR+)= 1.04 , Likelihood ratio negative (LR-) = 0.86, Diagnostic Odd ratio (DOR)= 1.21 95% confidence interval (CI )=0.2589 - 5.64.

**Conclusions:** US has good diagnostic accuracy compared to MRI in detecting meniscal tears. This may suggest that US can be used instead of MRI in clinical practice. It is simple and relatively cheap investigation.

**Keywords:** Meniscal tears, Ultrasound, Magnetic resonance imaging, diagnosis

## INTRODUCTION

Meniscal injuries are common with significant morbidity and impact on patients activity of daily living and quality of life<sup>(1)</sup>. The diagnosis of meniscal pathology is mostly by clinical assessment, magnetic resonance imaging (MRI) and or arthroscopy. Early and accurate diagnosis is vital for determining a precise suitable and correct treatment in addition to accurate prognosis of the patients to return to function in short time<sup>(2-5)</sup>.

Although MRI is the gold standard imaging for diagnosis of meniscal pathology, however its performance may take time of weeks to months in

addition to other drawbacks like being costly, not available in all centers, misdiagnosis of 14-47% of cases and claustrophobia<sup>(6-8)</sup>. Ultrasonographic examination is a promising simple, portable, safe, less cost, and effective tool for diagnosis of meniscal injury<sup>(9-11)</sup>. Yet, there were limited studies on the use of ultrasound in diagnosis of meniscal pathology<sup>(12-14)</sup>. This study was designed to evaluate the accuracy of US in comparison MRI in diagnosis of medial meniscal tears

## PATIENTS AND METHOD

**Study design:** This observational cross sectional diagnostics accuracy study was conducted at Orthopedic and Rheumatology Units at Baghdad Teaching Hospital from August 2013 to August 2014.. We compared US with MRI for diagnosis of meniscal injury and assessed the diagnostic accuracy of US.

**Participants:** Eligible Patients with age >18 years and had knee pain were included in this study. Exclusion

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criteria included patients who other comorbid systemic diseases, taking medications like corticosteroids and diuretics or evidence of loose bodies on plain radiographs, or any prior surgery that may cause knee pain.

**Measurements:** Data collection included age, sex, history of trauma, knee pain, tender joint line, positive McMurray’s test, and positive Apply test for meniscal injury performed by an orthopedist. Ultrasound (Netherland, Phillips, HD 11XE, transducer L12-3) and MRI of the affected knee joint was performed using extremity coil with Philips Achieva 1.5 tesla MRI device using a standard imaging protocol in sagittal, coronal and axial planes. No contrast media were administered. A single expert radiologist perofrmed the US and read it and another expert radiologist read MRI scans who was blinded to the result of US reading.

**STATISTICAL ANALYSIS**

Statistical software (SPSS version 23, IBM, USA) was used for data input and analysis. Kolmogrove smirnov test was used to assess the normal distribution of continuous variables. Normally distributed continuous variables were presented as mean ± standard deviation (SD) and categorical variables were presented as numbers and percentiles. Sensitivity, specificity, positive

predictive, negative predictive values and accuracy, LR + , LR - , DOR were calculated using the 2×2 table. P-value < 0.05 was considered statitically significant.

**RESULTS**

A total of 50 patients involved in this study. Of those Males were 36 (72%) Mean age of the patients was 35.44 ± 12.09 years.

Meniscal tear diagnosed by US was detected in 35 (70%) patients and was absent in 15 (30) patients. While in MRI medial meniscal tears were detected in 44 patients (88%) and were absent in 6(12%) patients. There was no statistical significant difference between US and MRI (p=0.35) as shown in Table 1. Percent of agrement between US and MRI was 70% and krippendorf alpha was= 0.11

Diagnostic accuracy of US was 70% in comparison to MRI with sensitivity 91.4 %, Specificity 20%, and PPV at pre test probability 50% was 53.3%, and PPV at pretest probability 90% was 91.14%, and NPV at pretest probability 10% was 95.4% , LR+= 1.04, LR - = 0.86, DOR (95&CI)=1.21 ([0.2589 - 5.64] as in shown inTable 2 so US was a valid and a reliable test to discriminat and diagnose Meniscal injury

**Table 1: Comparison between ultrasound and magnatic resonance imaging in detecting medial meniscal tears**

Variables	Ultrasound	Magnetic resonmance imaging	P value	Percent of agreement	Krippendorf alpha
Meniscal tear present	35 (70%)	44( 88%)	0.35	70%	0.11
Meniscal tear abscent	15 ( 30%)	6 (12%)			

**Table 2: Validity parameters of Ultrasound in diagnosis of medial meniscal tears in comparison to magnetics resonance imaging**

Test	Validity parameters
US for diagnosis of Meniscal tear	Sensitivity = 91.4 %
	Specificity = 20%
	Accuracy = 70%
	PPV at pretest prbability 50% = 53.3%
	PPV at pretest probability 90% = 91.14%
	NPV at pretest probability 10% = 95.4%
	LR positive = 1.04
	LR negative = 0.86
Diagnostic odd ratio (95&CI)=1.21 ([0.2589 - 5.64]	

PV, positive predictive value, NPV, negative predictive value; LR, liklihood ratio

**DISCUSSION**

This study evaluated US imaging in comparison to MRI for diagnosis of meniscal injury. It showed that US imaging was not significantly differ from MRI and has a good percentage of agreement and was a valid reliable measure to differentiate meniscal injury cases from those who were normal. In addition, US has good accuracy with excellent PPV at pretest probability of 90% and Excellent NPV at pretest portability of 10%.

These findings are clinically important because it will help for early diagnosis and treatment with subsequently better prognosis and response of patients with simple, easy, relatively cheap and more applicable tool compared to MRI.

The current study agreed with other studies which reported that US was a valid and accurate tool to diagnose meniscal injuries. Cook et al evaluated MRI versus US to assess meniscal abnormalities in acute knees and demonstrated that US examination of the knee was effective diagnostic tool for meniscal pathology with potential advantages over MRI. Based on these data and available portable equipment, ultrasonography could be considered for use as a point-of-injury diagnostic modality for meniscal injuries <sup>(15)</sup>.

Mahdy et al determined the clinical usefulness of ultrasonography for diagnosis of meniscal pathology in patients with acute knee pain and compared its diagnostic accuracy to MRI in a clinical setting and concluded that ultrasound was useful for the screening of meniscal tears but detection of the morphology of meniscal tears seems insufficient <sup>(16)</sup>. Akatsu et al assessed the accuracy of high-resolution ultrasound in the diagnosis of meniscal tears compared with arthroscopic examination and suggested that US examination may be suitable for screening of meniscal tears <sup>(17)</sup>. Muresan et al evaluated the accuracy of US examination for the identification of meniscus injuries, in comparison with magnetic resonance imaging (MRI), using the arthroscopy as reference and concluded that US was able to identify the medial and lateral meniscus injuries with an accuracy comparable to that of MRI examination <sup>(18)</sup>. Anatolia et al investigate the role of Ultrasound (US) in the diagnosis of meniscus degeneration and tears as compared to Magnetic resonance imaging (MRI) and arthroscopy <sup>(19)</sup>.

This study has some limitations: 1<sup>st</sup>: cross sectional with small sample size. 2<sup>nd</sup> short duration of study, and the sampling was convenient. However, these can be solved by a prospective large cohort study. In spite of these limitations, the current study is the first study in Iraq that assessed US compared with MRI for diagnosis of meniscal injury with strict inclusion and exclusion criteria and blinded evaluation for comparison between US evaluator and MRI assessor.

## CONCLUSION

Ultrasound has good diagnostic accuracy compared to MRI in detecting Medial meniscal tears. This indicates that US may be used as alternative to MRI in clinical practice. It is simple, valid, reliable, and relatively cheap investigation.

**Conflict of Interest:** The authores declare that there is no conflict of interests between them.

**Source of Funding:** The source of funding was by authors.

**Ethical Clearance:** Ethical approval was obtained from the Ethics Committee of University of Baghdad, College of Medicine, Medical Department and Informed consent was obtained from each participant included in this study.

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# The Different Intake of Energy and Macronutrient on Weekdays and Weekend among Adolescent in Urban City

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## ABSTRACT

**Background:** Prevalence of over nutrition in adolescents has increased every year in the world. Over nutrition in adolescents can impact on metabolic syndrome, mental health problems, and decreased academic achievement. Over nutrition caused by various factors including food intake. During weekends some people use more time to relax and not control their food intake. Increasing food intake on weekends contributed to cause an increasing body weight at the weekends.

**Objective:** To analyze the differences energy and macro nutrient intake during weekdays and weekends in adolescents.

**Method:** The design of this study was cross sectional on students of senior high school aged 16-18 years with total sample was 82 people. Data were obtained using a recall questionnaire to determine food intake and anthropometric measurements of weight and height to determine the nutritional status.

**Results:** In boys and girls there is an increasing of energy and macro nutrients intake on weekends compared to weekdays. A total of 46 students were gain their body weight on the weekend. In girls energy intake increased 35.04 kcal, carbohydrate 11.82 grams, fat 0.03 grams and protein 3.15 grams. Whereas in boys energy intake increased 34.33 kcal, carbohydrate 11.02 grams, fat 10.25 grams and protein 2.85 grams. The average weight gain in girls was 0.35 kg and 0.31 in boys. Adolescent with the increased of energy intake on weekend risked higher 4.133 to gain the body weight on weekend day

**Conclusion:** To prevent weight gain and over nutrition, adolescents better to pay attention of their food intake on weekends both in terms of quantity and quality.

**Keywords:** macronutrient, obesity, weekend, weekdays

## INTRODUCTION

Obesity was a condition that caused a negative effect on health. In the world obesity more common in women with a prevalence 15% and men 11%.<sup>1</sup> Adolescent female had more risk of obesity than adolescent male. Adolescent female saved more excessive energy as stored fat, while adolescent male use excessive energy to synthesize protein. When physical maturity occurs, the

number of body fat in adolescent female usually twice more than adolescent male. This accumulation fat occurs in the area around the pelvis, breasts, and upper arms.<sup>2</sup>

Obesity adolescents with BMI above 95 percentile had greater risk of emotional stress compared to their peer who have normal status. Obesity and overweight in adolescents had an impact on the occurrence of metabolic syndrome problems, mental health, and decrease in academic achievement.<sup>3,4,5</sup> Adolescents obese who had a few friends were more likely to isolate themselves from their social environment and had higher risk of depression than normal adolescents.<sup>6</sup>

The NHANES (National Health and Nutrition Examination Survey) data from 2001-2004 and 2009-2012 showed that there was an increased prevalence

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of over nutrition in children and adolescents aged 2-19 years in United State and Canada from 16.6% to 17.5% and from 12.4% to 13%.<sup>7,8</sup> In Indonesia based on data from the Basic Health Research in 2013 found that prevalence of adolescents with over nutrition aged 16-18 years was 7.3% and prevalence in east java was 8.2%.<sup>9</sup> This research was conducted at 5 Senior High School in Surabaya because in the previous research study showed a percentage of students who were overweight was 33.1% and obese 8.9%, this percentage value exceeds the value of Province.<sup>10</sup>

Obesity is influenced by many factors, including factors genetic, energy intake, physical activity, environmental and emotional.<sup>11,12</sup> In several literature studies shown that in adolescents male and female there was an increased in energy and macro nutrients intake on weekends compared to weekdays. Longitudinal studies conducted in the United States using NHANES survey data showed that at the weekend the average of total energy intake increased 82 calories higher than weekdays.<sup>13</sup> Protein intake in girls was 10-15% higher on weekends than in weekdays and boys' average protein intake also increased at the weekend. On weekends the average of fat intake for boys was 7-15% higher and in women increases more than 20% compared to weekdays. Whereas carbohydrate intake for girls was increased 12-15% and boys 7% on weekend compared to weekdays.<sup>14</sup>

Longitudinal studies in the United States divided subjects into reducing calories group and increasing physical activity group showed that there was an increases of energy intake and body weight 0.077 kg per week. Although relatively small increasing but could have an impact of 4 kg increases in one year if the pattern of increased food intake on weekend continued.<sup>15</sup> The purpose of this study was to analyze the differences of energy and macronutrients intake during weekdays and weekends in adolescents who live in urban areas.

## METHOD

This study was an observational study with cross sectional study design. The location of the study was at 5 Senior High School in Surabaya. The study population was adolescents aged 16-18 years both male and female. This study was performed in April - September 2018. Students who were willing to take part in the study will be measured anthropometry body weight using digital scales with a precision level of 0.1 kg, height measurements using a stadiometer with a precision level of 0.1 cm, and filling questionnaires characteristic data. Body weight was measured in morning before starting studied in 3 times. The study didnot conducted during the exam period, students who were athletes and who still programming diet will be excluded from this study. The number of samples in the study was 82 students and randomly selected. Respondents' food intakes weremeasured using food recall 24 hours in 4 times that ware 2 times on weekdays and 2 times on weekend. Food recall data will process using the Nutrisurvey application to determine the amount of energy, carbohydrate, fat, and protein intake. Then the average energy and macronutrients intake on weekdays will be compare to weekend. While the nutritional status of respondents was determined using application of WHO Anthro Plus for aged 6 to 18 using weight, height, and respondent date of birth data.

## RESULTS

From the results of the study on 82 respondents in 5 Senior High School Surabaya, the distribution of nutritional status of respondents who were classified as underweight was 2.4%, normal 69.5%, overweight 9.8% and obesity 18.3%. Table 1 told about the characteristic of respondents showed that most of respondents were in class XI (65.9%), the average age of respondents was  $16.33 \pm 0.47$  years and male adolescent got more average pocket money (Rp. 23094) than female (Rp. 21740).

**Table 1: Characteristic of subjects**

Variable	Male (n = 32) Mean $\pm$ SD	Female (n = 50) Mean $\pm$ SD	Total (n = 82)
Aged	16.38 $\pm$ 0.49	16.30 $\pm$ 0.46	16.33 $\pm$ 0.47
<b>Class</b>			
XI	20	34	65.9%
XII	12	16	34.1%
Pocket money	23093.75 $\pm$ 11453.58	21740 $\pm$ 14688.34	22.268.29 $\pm$ 13.459.63

Conted...

<b>Nutrition Status</b>			
> 1SD	19	40	72%
≤1 SD	13	10	28%
<b>Physical activities (met)</b>			
Heavy	5	7	14.6%
Light - moderate	27	43	85.4%

**Table 2: Energy and macro nutrient intake on weekdays and weekend**

<b>Food Intake</b>	<b>Male (n = 32) Mean ± SD</b>	<b>Female (n = 50) Mean ± SD</b>	<b>Total (n = 82)</b>
<b>Weekdays</b>			
Energy (kcal/day)	2035.96 ± 141.43	1888.60 ± 115.78	1946.11 ± 144.89
carbohydrate (gr/day)	229.61 ± 23.89	212.68 ± 29.77	219.29 ± 18.49
Fat (gr/day)	88.05 ± 14.06	81.71 ± 15.13	84.18 ± 14.35
Protein (g/day)	78.17 ± 13.48	77.19 ± 16.71	77.57 ± 15.45
Body weight	66,21 ± 16,26	54,57 ± 13,43	59.11 ± 15.58
<b>Weekend</b>			
Energy (kcal/day)	2070.29 ± 161.10	1923.64 ± 146.19	1980.87 ± 167.46
carbohydrate (gr/day)	240.63 ± 31.92	224.49 ± 33.85	230.79 ± 33.85
Fat (gr/day)	85.19 ± 14.06	78.56 ± 15.13	81.15 ± 14.98
Protein (g/day)	88.42 ± 26.03	77.16 ± 11.28	81.55 ± 2.11
Body weight	66,45 ± 16,28	54,66 ± 13,50	59.26 ± 15.66
<b>Difference in food intake</b>			
Energy (kcal/day)	34.33 ± 131.60	35.04 ± 132.35	34.76 ± 131.24
carbohydrate (gr/day)	11.02 ± 41.77	11.82 ± 46.88	11.51 ± 44.69
Fat (gr/day)	10.25 ± 30.55	-0.03 ± 20.81	3.98 ± 25.39
Protein (g/day)	-2.85 ± 13.57	-3.15 ± 21.01	-3.03 ± 18.36
Body weight	0,31 ± 0,16	0,35 ± 0,17	0,15 ± 0,36

Table 2 showed that there were differences in energy and macronutrients intake both in male and female adolescent on weekdays and weekends. Overall, the average male adolescent intake was significantly higher than female adolescent, except for protein intake during weekdays. However, it was found that there was no significant difference in changes of food intake between weekdays and weekends in male and female adolescent.

**Table 3: The different of energy and macro nutrient intake between weekdays and weekend and the association with weight gain**

<b>The difference of food intake</b>	<b>Weight Gain</b>	<b>Constant or weight loss</b>	<b>P value</b>	<b>OR</b>
	<b>n (46)</b>	<b>n (36)</b>		
<b>Energy</b>				
Increased	40	5	0.002*	4.133
Decreased	6	31		
<b>Carbohydrate</b>				
Increased	30	22	0.702	1.193
Decreased	16	14		

Conted...

<b>Fat</b>				
Increased	22	12	0.186	1.833
Decreased	24	24		
<b>Protein</b>				
Increased	27	16	0.200	1.776
Decreased	19	20		

chi-square test \*significant,  $p < 0.05$ 

Based on table 3 showed that there was a significant association between increasing energy intake and weight gain on weekends with p value score 0.002 and odds ratio 4.133, it means that respondents who increased intake of energy on weekend 4.133 risked gained their weight on weekends.

## DISCUSSION

Carbohydrate, fat and protein nutrients were source of energy for the body that was needed for daily activities.<sup>16</sup> Consumption excessive macronutrient will be stored in form fat reserves. Excessive accumulation of fat in fat tissue causes individuals being over nutrition. The prevalence of overnutrition(overweight and obesity)in this study was 28% that occur in 20% of female adolescent and 40.6% of male adolescent.The results showed that in adolescent male and female during weekdays there were significant differences in energy, carbohydrate and fat intake.However, on weekend energy and all of macronutrient intake were significant difference. When energy intake greater than the energy released, it causes energy imbalances in the body and can be impact to an increase of body fat mass.<sup>17</sup>

The results of this study show that there was an increased energy intake on weekend both in adolescent male and female with an average increased 35.05 kcal in adolescent female and 34.33 in adolescent male. This was in line with the cross-sectional study in children aged 10 years and over, who showed that intake of energy on weekend increased 8% compared to energy intake during weekdays.<sup>18</sup>nutrients, and food groups intake between days of the week and weekend days in the Brazilian population. METHODS We used data from the first National Food Survey (2008-2009 Longitudinal studies conducted in America also stated that the average intake energy on weekend increased 82 calories higher than weekdays.<sup>13</sup>

Carbohydrates were the main energy source for the body. Excessive carbohydrate intake will be stored in form of glycogen in liver and muscle tissue, and some of it will be converted into fat and stored in fat tissue.<sup>16</sup> In this study there was an increases carbohydrate intake on weekend 11.82 grams in female adolescent and 11.02 grams in male adolescent. In line with longitudinal studies conducted in high school student in Netherlands stated that carbohydrate intake of female adolescent was 12-15% higher on weekends, while male adolescent increased 7% higher. In male adolescent, carbohydrate intake increases with age, whereas in women decrease with increasing age.<sup>14</sup> In addition, research in Brazil also stated that the contribution of carbohydrates to daily energy intake on average 4% lower on weekdays than on weekends.<sup>18</sup>nutrients, and food groups intake between days of the week and weekend days in the Brazilian population. METHODS We used data from the first National Food Survey (2008-2009

Excessive accumulation of fat in fat tissue causes individuals being over nutrition. In this study the average fat intake on weekends increased 3.15 grams in female adolescent and 2.85 grams in male adolescent. Longitudinal research in adolescent high school students in the Netherlands stated that compared to fat intake during weekdays the average fat intake on weekends increased 7-15% in male adolescent and increased more than 20% in female adolescent.<sup>14</sup> In addition, cross sectional studies in Brazil also showed a higher percentage of total fat, saturated fat and trans fat intake on weekends than weekdays. In this study showed that in female adolescent increased of fat intake on the weekend had relation with body weight gain.

Protein was a nutrient that has various important functions in the growth and maintenance of body cells, hormone formation, regulating water balance, antibody formation, transporting nutrients, and energy

sources.<sup>16</sup> Excessive protein intake will stored in form of triglycerides and can causes an increased fat tissue which affected to nutritional status.<sup>19</sup> The results of this study showed that the average protein intake at the weekend increased 0.03 grams in female adolescent and 10.25 grams in male adolescent. Longitudinal studies in high school student in Netherlands school also stated that female adolescent have 10-15% higher protein intakes on weekends than on weekdays. Whereas in male adolescent also showed a high average protein intake on weekends. Both on weekdays and weekends, animal protein intake twice more consumed than protein intake from vegetable sources.<sup>14</sup>

In this study, 46 of students gain their body weight over the weekend. Compare to weekdays the average of body weight at the weekend increased 0.35 kg in female adolescent and 0.31 in male adolescent. According to McCarthy, a consistently increase in food intake every weekend has a significant impact on body weight for one year. An increases of 100 kcal every weekend for a year causes an increases 2 kg of body weight which contributes to an increasing the prevalence of overweight and obesity.<sup>20</sup> Longitudinal studies in America also showed an increases 0.077 kg in body weight on weekend. Even though it was small, but it has an impact of 4 kg increased body weight in one year if the pattern of increasing intake on weekend continues.<sup>15</sup> This study showed that increasing intake of energy and macronutrients on weekend had an effect on weight gained. Adolescent with the increased of energy intake on weekend risked higher 4.133 to gain the body weight on weekend day

## CONCLUSION

The result of this study was 28% of respondents were classified as having nutritional status overweight and obesity. Both male and female adolescents had increased energy and macronutrients intake on weekends compared to weekdays. A total of 46 student in this study gained their weight on weekend. Adolescent who increased their intake of energy on weekend 4.133 risked gained their weight on weekend. Adolescents better to pay attention of their quantity and quality food intake on weekends to prevent being over nutrition, and needed further research to see how it relates to gaining weight.

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# Factors Affecting Waiting Time for Outpatient Medical Record Documents in General Hospital Dr. H. Moch. Ansari Saleh Banjarmasin

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## ABSTRACT

Waiting time of medical record documents should be less than or equal to 10 minutes. The evaluation result of providing medical record documents waiting time in The General Hospital Dr. H. Moch. Ansari Saleh  $\leq$  31 minutes. This study analyzed the influence factors of storage, management, and procedures of medical records, perceptions of the suitability of human resources for waiting time, and material resources. The research method was analytical descriptive with cross-sectional approach. The sample size is two samples, namely 399 BPJS (health insurance) patient documents and 12 samples of medical record staff. Bivariate analysis using the Multiple Logistic Regression test and Odds Ratio. The waiting time required from outpatient patients is registered until the objective document is available  $\leq$  41 minutes. So that it can be concluded that the waiting time for medical record documents is relatively long. From the factors that influence the results obtained by the medical record document storage  $p\text{-value}=0.289>0.25$ ;  $OR=2.648$ ; management of medical records  $p\text{-value}=0.289>0.25$ ;  $OR=2.086$ ; the procedure for retrieving medical record  $p\text{-value}=0.289>0.25$ ;  $OR=2.648$ ; transportation of medical records  $p\text{-value}=0.289>0.25$ ;  $OR=2.648$ ; perception of human resource suitability  $p\text{-value}=0.289>0.25$ ;  $OR=3.315$ ; material resources  $p\text{-value}=0.289>0.25$ ;  $OR=2.648$ . From each variable that there is no influence of factors that influence the waiting time of outpatient medical record documents in the general hospital Dr. dr. Moch Ansari Saleh Banjarmasin.

**Keywords:** *medical record, waiting time, influence factors*

## INTRODUCTION

Medical records affect the quality of health services received by patients. Medical records can also be used as educational materials, research, and quality assessment. Medical records that are maintained carefully are very important for the health care system and patients.<sup>1</sup>

In order for medical records to be used perfectly, a hospital must carry out medical records including

registration, storage, and processing of medical record data. Registration of patients at the hospital has several parts including outpatient registration, inpatient registration, and registration of emergency patients. At the time, the arrival of the patient is enrolled in a hospital consisting of old patient registration and new patient registration.<sup>2</sup> Providing services to good medical records is reflected in fast, friendly and comfortable services. Minimum service standards are provisions regarding the type and quality of basic services which are the minimum technical specifications in the distribution of medical record services. Minimum service standards (SPM) for medical records include completing filling in medical records 24 hours after completion of service, completeness of informed consent after obtaining clear information, when providing medical records documents for outpatient/inpatient services.<sup>1</sup>

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Provision of medical record documents is said to be fast if the time used for medical record distribution is less than or equal to 10 minutes.<sup>2</sup> As a comparison data between minimum service standards and Director's Decree on Medical Record service policies. The service quality indicators in the medical record unit have 3 quality indicators that are problematic, one of them is the difference in the provision of medical record documents between the results of monitoring and evaluation of medical records with the Ministry of Health in 2008 and the Director's Decree on hospital service policies. medical record documents according to SPM  $\leq$  10 minutes and Policy Decree  $\leq$  20 minutes. While the results of the monitoring and evaluation of the time of providing medical record documents in General Hospital Dr. H. Moch. Ansari Saleh  $\leq$  31 minutes. From the results of document survey data belonging to 8 people studied with the guidance of the head of the medical record unit, data obtained on waiting time in providing medical record documents at the latest  $\leq$  37 minutes.

The waiting time for outpatient medical record documents is long enough to be 37 minutes. The period affected many factors, namely the storage of medical record documents, medical record management, types of medical record services, procedures for retrieving medical records, transporting medical records and human resources to waiting times, as well as facilities for waiting time.

Based on the description above, researchers are interested in conducting research for the waiting time of outpatient medical record documents in outpatient services based on SPM providing medical record documents can affect patient waiting time and is one of the important things to determine quality hospital services and patient and family dissatisfaction in service.

## MATERIALS AND METHOD

The research method used is Analytical Observation or Analytical Descriptive with Cross-sectional approach. The sample size in this study were two samples, namely 399 BPJS (health insurance) patients and 3 samples of medical record workers on the grounds that there were several related questions regarding medical record documents for patients who could not obtain information from patients. Analysis of data used Univariate Analysis with the aim to determine the frequency distribution and presentation of independent variables, Bivariate

Analysis to determine the factors that influence waiting time by using Odd Ratio and Multivariate Analysis using the Multiple Logistic Regression tests.

## FINDINGS AND DISCUSSION

Waiting Time for Medical Record Documents for Outpatients in General Hospital Dr. H. Moch Ansari Saleh of Banjarmasin the average time required is 4 minutes from BPJS counter to numbering section, 8 minutes for medical record finding, 11 minutes to find and sending, 16 minutes for medical records sent and arrived at the destination polyclinic as well as the overall procedure and medical record flow for 41 minutes.

The results of univariate analysis show that waiting time medical record documents that are the subjects of the study are 399 medical record documents with raw road patients with categories  $\leq$  20 minutes as many as 18 medical record documents or 4.5% and 381 medical record documents or 95.5% of categories that are not suitable for waiting time for outpatient medical record documents.

The factor that influences the waiting time of outpatient medical record documents in General Hospital Dr. dr. H. Moch Ansari Saleh, Banjarmasin city, which is a place for storing medical record documents that are the subject of research is outpatient medical record staff, amounting to 12 medical record staff with the appropriate category 58.3% and 41.7% inappropriate categories. The management of medical records that are the subject of research is the outpatient medical record staff, amounting to 12 medical records with categories of 50% and 50% according to inappropriate categories. The procedure for retrieving medical record documents that are the subject of research is outpatient medical record staff totaling 12 medical record staff with the appropriate category of 58.3% and 41.7% inappropriate categories. Distribution of medical record documents that are the subject of research is outpatient medical record staff, amounting to 12 medical records staff with the appropriate category 58.3% and 41.7% inappropriate categories. The effect of conformity perceptions of human resources includes the number of personnel, competencies, and medical record workloads that are the subjects of the study are outpatient medical record staff, amounting to 12 medical record staff with the corresponding categories of 66.7% and 33.3% categories that are not corresponding. Material resources, namely



the facilities and infrastructure of medical records that are the subject of research are outpatient medical record staff totaling 12 medical record staff with the appropriate category of 58.3% and 41.7% inappropriate categories.

**Table 1: Results of Bivariate Analysis of Variables**

Independent Variables	P value
medical record document storage place	0.289
management of medical records starting from patients registering, numbering, searching, inputting in a hospital information system, medical record delivery to destination polyclinic	0.289
procedures for medical record document collection	0.289
transportation of medical record documents	0.289
conformity perception of human resources includes the number of personnel, competence, and workload	0.289
material resources, namely facilities and infrastructure	0.289

Based on the results of the bivariate analysis Table 1 shows that all independent variables produce  $p\text{-value} > 0.25$  seen from the results in the Omnibus Tests of Model Coefficients column which shows all independent variables have no effect on the dependent variable (document waiting time). However, all fixed variables were analyzed multivariate because they were considered important with the waiting time of medical record documents.

Furthermore, multivariate analysis of the six independent variables was carried out with the waiting time of the medical record documentation. From the results of the analysis, there are 6 variables that have a value of  $> 0.05$ , namely the storage of medical record documents, management of medical records starting from patients registering, numbering, searching, inputting in management information system, sending medical record to the destination clinic, procedure retrieval of medical record documents, transportation of medical record documents, conformity perceptions of human resources include the number of personnel, competencies, and workloads, material resources namely facilities and infrastructure. Of all the fixed variables it has a  $p\text{-value} > 0.05$  so that it cannot proceed to the next multivariate analysis.

From the independent variables, there are no influence on the waiting time of medical record documents, there are other factors that affect the place of registration of medical records of outpatients, patients not carrying KIB, requirements for patients who incomplete, old patient claimed to be a new patient, information system and utility (printer) error. Lack of communication

between patients and officers so patients did not carry complete registration requirements, Patients were wrong in the registration counter, new patients did not fill out the registration form for new patients.

The results of the study are in accordance with the observations of the storage of medical record documents using Roll O’Pack cabinets or moving cabinets that provide shifting, the arrangement of the filing space can save more space because there is no need to provide cabinets between one another as in other models. Related to the use of this cupboard, it can use a place or area that holds the medical record file in the filing room as a whole to be larger.<sup>4</sup>

In addition to the six independent variables in the concept of multicollinearity is a situation where there are two variables that mutually correlate. The existence of a relationship between independent variables is something that cannot be avoided and is indeed needed so that the regression obtained is valid.<sup>3</sup> Multicollinearity test was conducted to see whether there was a correlation between the perfect relationship between the independent variables. The test aims to find out whether the regression model is found to have a correlation or relationship between independent variables. A good regression model does not occur correlation or relationship between independent variables. If the independent variables are correlated or related, then these variables are not orthogonal, orthogonal are independent variables whose correlation value between each independent variable is zero.

On the independent variable, the classical assumption of multiple regression models was carried out with Multicollinearity Test.

**Table 2: Multicollinearity Test Result**

Model	Collinearity Statistics	
	Tolerance	VIF
Storage place for medical record documents	0.021	47.271
Management of medical records Starting from Patients Registering, Numbering, Finding, Inputting on Hospital Information System, Medical Record Delivery to the Polyclinic	0.016	64.100
Procedures for retrieving medical record documents	0.038	26.276
Transportation of medical record documents	0.042	23.711
Suitability perceptions of human resources include the amount of energy, competence, and workload	0.047	21.079
Material resources, namely facilities and infrastructure	0.034	29.754

Based on the results of the SPSS output, it can be seen that the tolerance value of all independent variables is smaller than 0.10 and the value of VIF for all independent variables is greater than 10.00. So, it can be concluded that all the variables from the SPSS output value occur multicollinearity. The presence of multicollinear data can be seen in the correlation between predictors that are too high (above 0.8 or 0.9) indicating that the data is infected with multicoll.

The implementation of medical record activities needs to be supported by the existence of Material Resources including facilities and infrastructure. The hospital information system is the most important part of hospital management to support better quality of service, while the administration of medical records must be regulated and managed in such a way that all patient data contained in the medical record can be kept confidential. Therefore, every leader of health service facilities must pay attention to the administration of medical records, because indirectly they must be able to account for all loss, damage, forgery and use by bodies or entities that are not entitled to medical records.

Facilities and equipment are all things that support the ease of execution of tasks and management of medical records. Appropriate storage equipment for medical records, good lighting and temperature regulation, maintenance of space and attention of officers to safety factors that greatly help maintenance, encourage work enthusiasm and increase productivity of officers. In a row of medical record folders stored must be given out instructions to speed up the storage work and find medical records. The medical record file should be given a cover for protection and maintain the contents of the medical record so that each sheet is not torn or torn, because it is often taken or back and forth. The cover or protective folder is equipped with a clamp (fastener) to combine the sheet on the cover.

## CONCLUSION

The service time for providing medical record documents takes an average of 0 hours 41 minutes. So that it can be concluded that the waiting time for medical record documents is quite long. From the research factors that influence the waiting time of outpatient medical record documents in The General Hospital Dr. H. Moch Ansari Saleh Banjarmasin namely there is no influence of medical record document storage places on the waiting time of medical record documents, management of medical records starting from patients registering, numbering, distributing and finding, inputting in hospital information system, medical record delivery to the polyclinic, procedures, transportation, perception of source suitability human power includes the amount of energy, competence, and workload on the waiting time of medical record documents, material resources, namely facilities and infrastructure to the waiting time of medical record documents.

**Ethical Clearance:** This study approved ethical clearance from the Committee of Public Health Research Ethics of Medical Faculty, Lambung Mangkurat University, Indonesia. We followed guideline from Committee of Public Health Research Ethics of Medical Faculty, Lambung Mangkurat University, Indonesia for ethical clearance and informed consent. The informed consent included the research title, purpose, participants' right, confidentiality, and signature.

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**Conflict of Interest:** The authors declare that they have no conflict interests.

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# The Presence of Lead in Blood of Pregnant Women at the First Trimester in Al Najaf City–Iraq

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## ABSTRACT

A certain concern is related to the presence of lead in the bloodstream of pregnant women due to its passage to the developing fetus. This study aimed to assess lead blood levels in first trimester pregnant women in Al-Najaf city . A cross-sectional study design was applied including 48 pregnant women at the first trimester who were met the inclusion criteria. Samples of blood were collected under aseptic technique and have been tested in the laboratory of the pharmacy college of Al-Kufa . Findings of the study revealed that high proportion of women aged 15-25 years while the lower proportion aged ( $\leq 36$  years). The mean blood lead level was  $<1$   $\mu\text{g}/\text{dl}$  in 36 women (75%), 1  $\mu\text{g}/\text{dl}$  in 4 (8.33%) and  $\geq 2$   $\mu\text{g}/\text{dl}$  in the remaining 8 (16.67%) women , (P.value =0.001). However, the blood lead levels of the studied group ranged (0.10 – 114.95)  $\mu\text{g}/\text{dl}$  with highly statistically significant difference between minimum and the maximum values, (P.value $<0.001$ ). The mean prenatal blood lead level of housewives and worker women was (0.255 and 7.136  $\mu\text{g}/\text{dl}$ ) respectively with highly statistically significant difference (P.value=0.001). A strong direct correlation had been found between the previous abortion and prenatal lead blood levels ( $r = 0.83$ ). In conclusion a significant proportion of women at first trimester had high levels of blood lead and it was associated with previous abortions. hence we recommended to conduct blood lead testing on all pregnant women and establish a program for the treatment.

**Keywords:** Blood Lead, abortion, Pregnancy, First trimester

## INTRODUCTION

Lead can be defined as a heavy metal, this element exists in various places including gasoline, old paints, costume jewelry of children, and many types related to industry and hobbies<sup>1</sup>. In the year of 1978, the government of US restricted using paints which contain lead, and in the year 1980 they limited using lead in gasoline. The industries of printing, manufacturing batteries, auto-repair and pottery still use lead. High amounts of lead exist in some candy types which are made in Mexico on addition to few traditional or folk medications. Drinking water could contain some amounts of lead which have been leach out of pipes<sup>2</sup>. Swallowing or breathing lead could cause lead poisoning, also it could be passed from the mother to the unborn baby. The possibility of having a baby that experience a birth defect is estimated as three to five percent in each pregnancy. Lead become widely distributed in the environment, all the body organs could be damaged when there are high exposure levels, the higher damage was seen in blood, central nervous system and kidneys, the biochemical processes were affected, psychological and new behavioral function

were a weakness<sup>3-6</sup>. Even though the lead has half-life of (forty-five days) in human's bloodstream, the lead was stored in the bone of the pregnant women. Through pregnancy, some calcium is needed for fetal bone growth especially at the first and second trimester. The lead was cross placenta instead of calcium in the pregnant women through formation of fetus body<sup>6,7</sup>. The present study tried to tracing of lead in the blood of a pregnant woman in the first trimester and to find association between lead levels in blood and previous abortion.

## MATERIALS AND METHOD

**Study Design:** A cross-sectional study.

**Period of the Study:** The duration of collecting the samples was from 1-1/2018 to 1-2/2018.

**Place of the Study:** The study has been carried out in Al-Najaf city, the center of Al-Najaf province.

**Sampling Design and Collections:** A randomly samples technique that was the method of choosing the prenatal

women that attending to Al-Zahraa teaching Hospital for childbirth.

**Included Criteria:** by chosen of pregnant women at the first trimester by using a well-designed questionnaire.

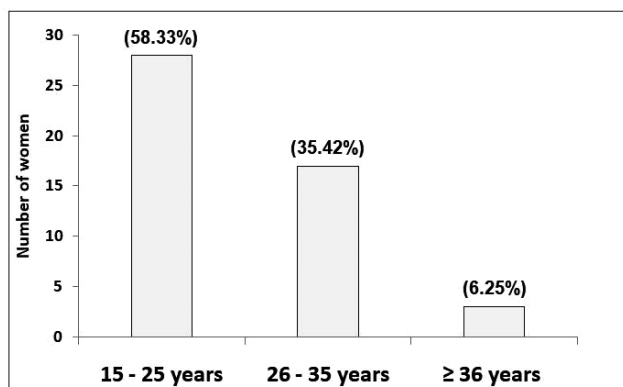
The sample was 48 women, that chosen from pregnant women that reach to the counseling ward, and we were made a vein puncture at the laboratory of a hospital, 5 ccs was collected from each woman by Jell Tube, then we were centrifuge of all blood samples to take the serum.

**Laboratory Tests:** All serum samples were tested by atomic absorption spectrometry for screening the presence and concentration of the lead in the serum in µg/dl, all the serum that tested was transport to the laboratory of the faculty of the pharmacy/university of Al-Kufa.

**Data Analysis:** Descriptive and analytical statistics have been conducted through applying the statistical package for social science (S.P.S.S) v18. The Z-test has been used for the purpose of obtaining significant statistical differences. Furthermore, Pearson correlation has been utilized between abortions and blood lead concentrations of prenatal women.

### FINDINGS

Figure 1: Show that the high number and percentage women of blood lead was at the age group of (15-25 years), while the age group of (≥ 36 years) was the lowest number and percentage.



**Figure 1: Number and proportions of the women according to age groups**

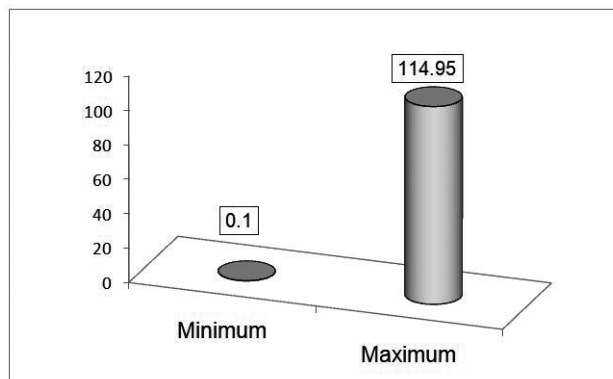
(Table 1): Showed a highly statistically significant difference (HS) between the mean of blood lead levels of prenatal women sample with the *P-value* = 0.001,

and the higher number and percentage of 36 ( 75 %) respectively were in <1 µg/dl, while the lowest number and percentage 4 (8.33 %) respectively were at level of 1 µg/dl. The highly mean (42.19) of prenatal women blood lead levels was at level ≥ 2 µg/dl. Figure (2): Showed that a higher significant difference existed between minimum and maximum value of prenatal women blood lead levels of (0.1 and 114.95 µg/dl) respectively, at the *P-value* = 0.001.

**Table 1: The number and percentage of women group sample of blood lead levels in µg/dl**

Blood Lead levels	Prenatal Women Sample n (%)	Mean Lead level
<1 µg/dl	36 ( 75 %)	0.34
1 µg/dl	4 (8.33 %)	1.26
≥ 2 µg/dl	8 (16.67 %)	42.19
Total	48 ( 100%)	7.39

**Z-test, P. value = 0.001, highly significant**



**Figure 2: The comparison between the minimum and the maximum value of prenatal women blood lead levels in a unit of microgram per decilitre**

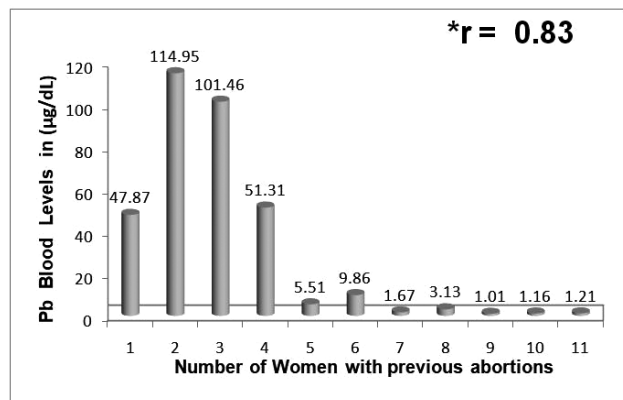
(Table 2): Showed that a highly statistically significant difference (HS) existed between housewife and women working with the *P-value* 0.001 of prenatal women blood lead levels and the lead blood levels of housewife and women worker were (0.255 and 7.136 µg/dl) respectively.

**Table 2: The comparison between housewife and women worker of blood lead values of prenatal sample women**

Subgroup	Mean level of lead in blood (µg/dl)
Housewife	0.255
Worker	7.136

**P- value (z-test) = 0.001, highly significant**

Figure (3): Showed that there were a strong direct positive correlation between the previous abortion and prenatal lead blood levels at ( $r = 0.83$ ), which mean the number of women with previous abortion increases when the lead blood levels were increased, and there were 11 women out of all sample that was had history with abortion.



**Figure 3: The number of women with previous abortion in relation with lead blood levels of prenatal women sample. (\*strong direct correlation)**

## DISCUSSION

A pregnant women's that inhabited in the city is always her unborn baby at risk, by exposure to air pollution, also, pollutants could go in her blood through breathing. Pollutants such as lead in bloodstream could pass through placenta to the organs and developing bones of the baby. Lead readily cross the placenta via passive diffusion and it was noticed in fetal brain as early as the end of the first three months of pregnancy<sup>5,8,9</sup>. The present study was showed a clear variation in number and percentage between the age group of prenatal women lead blood levels, this finding was in agreement with a similar study by Wright, et al, in the united states 2008<sup>11</sup>. However the present highly women number and percentage in lead blood levels were found at the age group of (15-25 years) of 28 (58.33%) respectively, this might be due to more age group of exposure than another age group in the city to air pollutants like lead that inhaled through the different activity outside the home. The present study was showed a highly statistically significant difference (HS) between the mean of blood lead levels of prenatal women sample with the  $P$ -value = 0.001, and the lowest mean of prenatal women blood lead level was (0.34 µg/dl) at the level <1 µg/dl, while a highly means of prenatal women blood lead levels was (42.19 µg/dl) at a level of  $\geq 2$  µg/

dl, this results confirmed that the lead was found at the all study group of all sample of prenatal women but in different concentration, which indicates that al-Najaf city was one of the highest air polluted city especially with pollutants that emission from the vehicles like lead emission because of use of leaded benzene in the city. This finding agreed with that of Elderderly, et al<sup>12</sup> from Sudan in 2015.

In the present study there was a highly statistically significant difference (HS) between a minimum and maximum value of prenatal women blood lead levels of (0.1 and 114.95 µg/dl) respectively, at the  $P$ -value = 0.001, the same finding was in agreement with Tong, et al in 2015, Australia<sup>10</sup>. In the present study, there were a highly statistically significant difference (HS) between housewife and women working with the  $P$ -value 0.001 of prenatal women blood lead levels, the lead blood concentrations of housewife and women worker were (0.255 and 7.136 µg/dl) respectively. This significant differences between a housewife and working woman might be due to the variation in the exposure level of the air pollutant especially inorganic lead in the air of the al-Najaf city, which mean the increases of exposure to air pollution lead to increases of inorganic blood lead of prenatal women. the same finding was agreement with the Aleemuddin, et al from India at 2015<sup>13</sup>. In the present study, there were a strong direct positive correlated between the abortion and prenatal lead blood levels at ( $r = 0.83$ ), which mean the number of women with previous abortion increases when the lead blood levels were increased, and there were 11 women out of all sample that was had a history with abortion. This result agrees with. Arnold, et al in the USA at 2013<sup>14</sup>, that finding the same direct positive correlation. To all results that obtained from a present study, there was a clear association in blood lead level of prenatal women and air pollution in the al-Najaf city with the effect of study women.

## CONCLUSION

Blood lead was present in all samples of pregnant women. Some pregnant women had a highly significant blood lead level. There was a much difference between the minimum and the maximum levels of blood lead. The worker pregnant women had a higher mean blood lead than housewives There was a clear direct correlation between previous abortion and presence of blood lead levels of more than 1 µg/dl.

**Ethical Clearance:** All official agreement were obtained, signed informed consent obtained from each participant women. Data collected in accordance with the World Medical Association (WMA) Declaration of Helsinki as a statement of ethical principles for medical research involving human subjects

**Conflict of Interest:** Author declare none

**Source of Funding:** Self-funded

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# Knowledge, Attitude and Practice of Relapse Malaria Patients. a Cross Sectional Study from Mandailing Natal District, Indonesia

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## ABSTRACT

**Background:** Malaria is still the most serious public health problem and the major cause of death. Currently, the number of relapse of malaria is at an alarming and unprecedented rate. It made the prevalence of malaria escalating. Many factors have come together in making this situation such as dense population, mosquitos paracites, resistance to antimalarial drugs, climatic changes and knowledge, attitudes and practices (KAP) of patients. This study aimed to determine the relationship of knowledge, attitudes and practices against the relapse of malaria.

**Method:** The present study was a cross sectional design taken place in Mandailing Natal District, Indonesia. The study involved 153 malaria adult patients selected purposively, consisted of 123 malaria patients and 30 relapse of malaria. Thirty KAP questions compiled from several KAP studies were delivered to patients. To analyze the relationship between knowledge, attitudes and practices with relapse of malaria, a Chi-square test and logistic regression was performed.

**Results:** Most of relapse patients had low knowledge (76.4%), attitudes (61.4%) and bad practices (77.3%). There was a significant relationship between KAP with the incidence of relapse of malaria. Education, income, farmer and ventilation were strongest predictors of being relapse of malaria.

**Conclusion:** Level of knowledge, attitudes and practices affected relapse of malaria. The current control malaria program need to be intensified with malarial education and prevention campaigns. Taken proper and regular antimalarial medicines being important message.

**Keywords:** *knowledge, attitudes, practices, relapse, malaria*

## INTRODUCTION

The global malaria eradication program had been started in 1950s and in 19702 the diseases incresing slowly in Asia regions and South America. It is predicted more than 100 million deaths from malaria annually. In sub-Saharan Africa, 90% of deaths were related to the presence of the vector *Anopheles gambiae*, which is the most infectious mosquito<sup>1</sup>.

The program was very successfull in certain countries such as India, Sri Lanka and Soviet Union.

Even in United States and Europe, malaria was eliminated during the first half on the twentieth century <sup>2</sup>. However, malaria is still the most serious public health problem and the major cause of death <sup>3</sup>. According to World Health Organization, in 2015 there was about 214 million new malaria cases and 438 thousands deaths from malaria<sup>4</sup>. (WHO, 2016). In Indonesia, of a total 216 million malaria cases, 655 thousands were died <sup>5</sup>.(Kemenkes RI, 2013). Eventhough the progress of malaria control was successful, malaria eradication seemed imminent. Many factors have come together in making this situation. The factors are dense population, presence mosquitos paracites, resistance to antimalarial drugs, climatic changes including the knowledge, attitudes and practices (KAP) of patients <sup>6-8</sup>

Number of relapse of malaria is at an alarming and unprecedented rate. It made the prevalence of malaria has been escalating in Africa. Malaria has been to cause

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2.3% of global disease and 9.0% of disease in Africa 6. There are many factors contributing to relapse of malaria such as rapid spread of malaria parasites resistance to chloroquine, migration of non-immune population, climate changing, changes of in the behavior of vectors from indoor to outdoor biters<sup>6,9</sup>. However, KAP studies on malaria had proved that malaria re-emergence related to knowledge, attitudes and practices about malaria<sup>3,7-10</sup>. In study location, the *Annual Parasite Incidence* (API) and relapse of malaria incidence are at alarming rate. Therefore, the current study aimed to determine the knowledge, attitudes and practices of relapse of malaria.

### METHODS AND MATERIAL

**Study site:** The present study was a cross sectional design taken place in Mandailing Natal District, North Sumatera Province. Malaria is endemic in this district. Among 23 sub-districts, 22 of them were found malaria case. The *Annual Parasite Incidence* (API) in Natal district was 6.8%. A 2016 census indicated approximately 463,000 inhabited in Natal district <sup>11</sup>. Most residents engage in cultivating rice, rubber and coconut.

**Participants:** There were 153 malaria adult patients selected purposively, consisted of 123 persons were not relapse patients and 30 persons relapse. The inclusion criteria were; living in district >10 years, aged 20-50 years old, not pregnant, routinely visited Primary Health Center. PHC conducted malaria control program such as insecticide treated bednet (ITN), insecticide spray and pills distribution. This background makes Natal district was selected for undertaking the study.

**Data collection:** The study carried out between June-September 2017. Thirty KAP questions compiled from several KAP studies were delivered to patients. The questions addressed to respondents following major categories: socio-economic characteristics, knowledge, attitudes and treatment seeking behaviour practices, personal prevention practices. The items on knowledge such as malaria transmission, type of mosquitos and parasites and medicines. Questions on attitudes and practices asking the patients on their agreement upon malaria control program, prevention activities and rule of taking antimalarial drug. For example; Do you agree indoor residual spray?, do you agree to take pills regularly, using bed nets, cover water tanks. The score of answers were changed into two categorics; high vs low knowledge; positive vs negative attitude and good vs bad practices. In determining the categories, the borderline was the mean score of answers.

For convenience and easy to understand, the questions were delivered in native Batakese language vice Bahasa Indonesia. Four local residents hired and trained to conduct this task. They were at least a high school education, could speak both Bahasa and Batakese language.

**Data analysis:** Data were entered and analyzed using soft-ware program Statistics Package for the Social Sciences (SPSS) version 6.0. To analyze the relationship between knowledge, attitudes and practices with malaria presented in distribution frequency and compared to other KAP malaria studies.

### RESULTS

**Table 1: Knowledge, attitudes and practices of respondents**

KAP variables	n	%
<b>Knowledge</b>		
High	50	32.7
Low	103	67.3
<b>Attitudes</b>		
Positive	59	38.6
Negative	94	61.4
<b>Practices</b>		
Good	51	33.3
Bad	102	66.7

As seen in Table 1. Of 153 of malaria patients participated in this study, around three fourth of them had low knowledge and bad practices, 67.3% and 66.7% respectively. However, 61.4% had positives attitudes in preventing malaria.

**Table 2: The p-values of socio-economic characteristics related to malaria prevalence**

Socio-economic characteristics	p-value
Age	0.08
Sex	0.02
Education	0.04
Types of occupation	0.04
Income	0.04
House ventilation	0.04

Table 2 implied that of six socio-economic characteristics, only age that had not significantly related

to malaria. Type of sex, education, occupation, income and house ventilation were significantly affected to malaria incidence ( $p$ -values = 0.02; 0.04; 0.04; 0.04; 0.04 respectively). Males worked as farmers had low income and lived in house with not enough ventilation prone to suffer malaria.

**Table 3: The relationship of knowledge, attitudes and practices with malaria status**

KAP Variables	Status of malaria				p-value
	Relapse n = 123		Not Relapse n = 30		
	n	%	n	%	
Knowledge					
High	29	23.6	21	70.0	0.02
Low	94	76.4	9	30.0	
Attitudes					
Positive	54	43.9	5	16.7	0.01
Negative	69	56.1	25	83.3	
Practices					
Good	28	22.7	23	76.6	0.02
Not Good	95	77.3	7	23.4	

Table 3 shows that the proportion of relapse patients who had low knowledge, negative attitudes and not good practices were double compared to not relapse patients. There were 76.4%, 43.9% and 77.3% of relapse patients had low knowledge, negative attitudes and bad practices while in not relapse patients only 30.0%, 16.7% and 23.4% respectively.

## DISCUSSION

The current study found that knowledge, attitudes and practices and socio-economic were the strong predictors of being relapse of malaria. With respect to knowledge, our investigation confirm that one in the three participants has misconceptions of malaria transmission and symptoms, eventhough they have ever experienced such as headache, vomiting and diarrhea. They should know that malaria symptoms can re-occur up to 1 year therefore they have to seek medical consultation. This findings confirm with study conducted by Weber et al. and Tyagi's found that repeated infection of malaria were understandable belong to socio-economic strata; poor living condition, poverty and poor health seeking behaviour and low knowledge, attitudes and practices<sup>7-8</sup>

Several studies showed that the causes of relapse pertaining to knowledge, attitudes and practices<sup>3,10,12-13</sup>

In term of attitudes, we found the residents of Mandailing Natal preferred self-treatment as the first action and seeking professional medical treatment after they failed to resolve the illness. Delay treatment may improve of relapse. Local health seeking behaviour might affected the attitudes of taking action in preventing malaria as it happened in several developing countries such as in Philippines<sup>14</sup>, Kenya<sup>15</sup>, Solomon Islands<sup>16</sup>.

Less malaria incidents in higher education may be due to better treatment of protecting from mosquitos bites and taking regularly anti malaria drugs. In this study, the higher education respondents followed the rule of taking drug; 15 mg for 5 days and followed with high dose primaquine, 30 mg twice a day for 7 days<sup>17-18</sup>. This dose is effective and practical. Numerous studies have shown that poor treatment and low compliance to the regimen had caused against relapse because the predominant species of malaria parasites has a relapse mechanism that results in the re-appearance of parasitemia<sup>19</sup>. Most countries with low relapse malaria-incidence areas used a dose of 15 mg of primaquine a day for 5 days<sup>17</sup>. Therefore our findings support the concept of those regimens.

This relatively low relapse malaria incidence of higher knowledge respondents also due to the greater access to media information and contact to health staffs. While others had low response to get information and communicate with health staffs due high social burden. This situation also seen Nigerian and Colombia<sup>12,20</sup>.

## CONCLUSION

The incidence of relapse of malaria happened because of low knowledge, attitudes and practices on malarial prevention. The current control malaria program need to be intensified with malarial education and prevention campaigns. Taken proper and regular antimalarial medicines being important message.

**Conflict of Interest:** None conflict of interest regarding to this research

**Source of Funding:** The research was funded by authors

**Ethical Clearance:** Ethical approval obtained from the local institutional ethics board of Polytechnic of Health.

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# Effect of Adding Different Levels of Green Tea Powder *Camellia Sinensis* to Diet on Some Physiological Traits in Broiler

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## ABSTRACT

This study was conducted at the Poultry Researches Station/Department of Animal Resource/Directorate of Agricultural Researches/Ministry of Agriculture, during the period from 15/5/2018 to 21/7/2018 to study the effect of adding green tea powder in broiler diet on some physiological traits.

In this study 300 (Ross 308) broilers at age of one day has been used, these birds has randomly distributed to 5 dietary treatments, each treatment has three replicated (20 birds/ replicates) T1 control treatment without adding green tea powder while T2 was used (0.5 %) of green tea powder, T3 used (1%) green tea powder, wherever T4 used (1.5%) of green tea powder and T5 used (2%) green tea powder. The birds had been fed with one diet during the experiment period and the diets content were calculated as <sup>(16)</sup>, the results of this study showed:

There was a high significant difference ( $P<0.01$ ) in plasma total protein for adding treatment and reached the best average in T5 treatment and a minimum average in T1 treatment, observed a highly decreased ( $P<0.01$ ) in plasma albumin levels for T4 treatment compared with other treatments, and there is a highly increased ( $P<0.01$ ) in plasma globulin levels in T5 and T4 treatment compared with T1, T2 and T3 treatments, there was a highly decreased ( $P<0.01$ ) in cholesterol levels in T5 compared it with control and other treatments, in the same time the results showed a high significant decreased ( $P<0.01$ ) in high density lipoprotein (HDL) for T5, T4 and T1 treatments compared to T3 and T2 treatments, and there was a high significant decreased ( $P<0.01$ ) in low density lipoprotein (LDL) in T2, T3, T4 and T5 compared to control, there was a highly decreased ( $P<0.01$ ) in very low lipoprotein (VLDL) levels in T5 compared with other treatments. For the triglyceride the results showed a high significant decreased ( $P<0.01$ ) in blood plasma for T2, T3, T4 and T5 treatments compared with control treatment.

This study recorded a highly decreased ( $P<0.01$ ) in ALT level for T5 compared to T4, T3, T2 and T1, in the other hand there was a highly significance ( $P<0.01$ ) in same trait for T3, T4 and T5 compared with T2, wherever the results showed a highly decreased ( $P<0.01$ ) in AST level in T5 and T4 treatment compared with T1, T2 and T3 treatments.

**Keywords:** Green tea powder, *Camellia sinensis*, physiological trait, broiler.

## INTRODUCTION

Due to the development presents in poultry and the infection of poultry with infectious diseases lead to decrease in reproductive performance and this leads to increase in veterinary costs and therefore high production costs so the researchers interested in herbals for the purpose of improving the productive and physiological performance of animals, including domestic poultry, and their use as an alternative to preservatives for the production of healthy and functional foods <sup>(1)</sup>, for avoiding the negative effects of the use of medicinal

drugs with the chemical origin of the birds, and to maintain consumer health and enhance the immunity of the body by stimulating the immune system <sup>(2)</sup>.

Green tea has many purposes such as antitoxin, anticancer, antiviral, antibacterial and anti-obesity and others purpose which belong that green tea contains catechins compound (GTCs)<sup>(3)</sup>, and contains phytochemicals, such as polyphenols and caffeine. Polyphenols found in green tea include epigallocatechin gallate (EGCG), epicatechin gallate, epicatechins and flavanols <sup>(4)</sup>, these flavonoids contains a substance called

catechins, the major catechins present in green tea are epicatechins(EC), epigallocatechins gallate (EGCG), epigallocatechins (EGC) and epicatechins gallate (ECG)<sup>(5)</sup>, which have antioxidant, anticarcinogen, anti-inflammatory, and anti-radiation biochemical effects in vitro <sup>(6)</sup>. Other components include three kinds of flavonoids, known as kaempferol, quercetin, and myricetin <sup>(7)</sup>.

Green tea is a rich of minerals elements which are essential for health like zinc, Iron, silver, manganese, magnesium, sodium, potassium, titanium, copper, bromium, aluminum, nickel and phosphorus <sup>(8, 9, 10)</sup>, these metal ions promote the antioxidant property of green tea<sup>(11)</sup>.

Green tea is reported to contain 4000 bioactive compounds, The active constituents in green tea are powerful antioxidants call polyphenols, and this polyphenols belong to flavonoids family <sup>(12)</sup>, and it's consider as basic phenolic compounds in green tea responsible for antioxidant activities that are form in the process of metabolism <sup>(13), (5)</sup>.

The aim of this study was to investigate the effect of adding different levels of green tea powder to broiler and its effect on the physiological performance and the.

### MATERIALS AND METHOD

**Birds and Dietary treatment:** This study was carried out at the poultry research/ office of the agricultural research/ministry of agriculture for 15/5/2018 to 21/6/2018 on 300 (Ross 308) broilers at one day age and randomly distributed to five dietary treatments with three replicated (20 birds/ replicates), T1 control treatment without adding green tea powder, while T2 used 0.5 % green tea powder, T3 used 1% green tea powder, T4 used 1.5% green tea powder and T5 used 2% green tea powder. All the treatments gave ad libitum diet and water in all the experiment period, the diet contents chosen as <sup>(14)</sup> which showed in (table 1).

**Table 1: Percentage composition of the experimental diets**

Ingredients %	Types of diets		
	Starter 1-13D.	Grower 14-27d.	Finisher 28-42d.
Corn	47.5	50.85	<b>54.84</b>
Wheat	10	10	<b>10</b>
Soybean Meal <sup>1</sup>	32	28	<b>24</b>
Protein <sup>2</sup>	5	5	<b>5</b>

Conted...

Hydrogenated Vegetable Fat	3	4.15	<b>4.3</b>
Dicalcium Phosphate	0.7	0.5	<b>0.4</b>
NaCl	0.1	0.1	<b>0.1</b>
Limestone	1.2	1.14	<b>1.1</b>
Methionine	0.25	0.13	<b>0.13</b>
Lysine	0.25	0.13	<b>0.13</b>
Total	100	100	<b>100</b>
<b>Calculated Values<sup>3</sup></b>			
M.E. Kcal/Kg Diet	3059	3177	<b>3277</b>
Crude Protein %	22.5	20.9	<b>19.3</b>
Crude Fiber %	3.5	3.4	<b>gt3.2</b>
Lysine %	1.38	1.19	<b>1.09</b>
Methionine Plus Cysteine %	1.08	0.92	<b>0.88</b>
Ca %	1.02	0.95	<b>0.90</b>
Available P %	0.45	0.41	<b>0.38</b>

### STATISTICAL ANALYSIS

Completely randomized design (CRD) was used to study the effect of different treatment in all traits, <sup>(15)</sup> and multiple range tests was used to compare the significant differences between means. Data were analyzed by using statistical analysis system <sup>(16)</sup>.

### RESULTS & DISCUSSION

Noticed from table (2) a high significant different ( $P<0.01$ ) in total protein in T5 compared with other treatments, and a high significant decreased ( $P<0.01$ ) in T4 compared to T1,T2 and T3, and a high significant decreased ( $P<0.01$ ) in T4 compared to T1,T2 and T3 treatments.

Also observed from table (2) a highly decreased ( $P<0.01$ ) in plasma albumin levels in T4 compared with T1, T2, T3 and T5 treatments, while there was a highly increased ( $P<0.01$ ) in globulin levels in T5 and T4 compared with T1, T2 and T3 treatments.

This significant improvement in total protein may be due to containment of green tea of minerals elements which are essential for health such as cooper which helps to increase growth hormone from pituitary gland <sup>(17)</sup>. Growth hormone also leads to a decrease secretion rate of corticosterone hormone from adrenal cortex <sup>(18)</sup>,

as well as the role of copper is important for antioxidant enzymes<sup>(19, 20)</sup>, and this provides protection against destruction reactions in the body through its role in the grape of free radicals and inhibit the destruction of

protein<sup>(21)</sup>, antioxidants also work to prevent proteins breakdown and thus improve their serum concentration<sup>(22)</sup>. And this improvement in total protein accompanied by improvement in albumin and globulin levels in serum<sup>(23)</sup>.

**Table 2: Effect of using green tea in broiler diet on total protein, albumin and globulin levels in blood plasma**

Treatment	Total protein (g/dl)	Albumin (g/dl)	Globulin (g/dl)
T1	3.500 ± 0.816 d	1.733 ± 0.76 a	1.76 ± 0.095 c
T2	4.433 ± 0.091 c	1.716 ± 0.144 a	2.616 ± 0.130 b
T3	4.616 ± 0.079 c	1.383 ± 0.107 ab	3.233 ± 0.117 b
T4	5.416 ± 0.144 b	1.283 ± 0.070 b	4.133 ± 0.147 a
T5	6.150 ± 0.095 a	1.633 ± 0.088 ab	4.516 ± 0.162 a
Significantly	**	**	**

The means with different letters within the same column are significantly between them (P<0.01) \*\*

Table (3) showed a highly decreased (P<0.01) in cholesterol levels in serum in T5 compared with T1 and other treatments, in the same time the results showed a high significant decreased (P<0.01) in high density lipoprotein (HDL) for T5, T4 and T1 treatments compared to T3 and T2 treatments, a high significant decreased (P<0.01) in low density lipoprotein (LDL) in T2, T3, T4 and T5 treatments compared to T1 treatment, while there is a highly decreased (P<0.01) in very low lipoprotein (VLDL) levels for T5 treatment compared with other treatments, results obtained from table (3) a high significant decreased (P<0.01) in triglyceride in T5 compared with other treatments, may be due to supplementing of green tea in diet may prevent an excessive accumulation of lipids in the liver and other tissues as a result of green tea content from caffeine and catechin which may have an inhibitor effect on intestinal absorption of lipids, and

may be due to the caffeine and catechin content of green tea may have an inhibitor effect on intestinal absorption of lipids<sup>(24)</sup>, and this may be due to the contain of green tea on the compounds epigallocatechins gallate (EGCG) that works to reduce from differentiation and proliferation of lipid cells and the manufacture of fat and the birth of new fat cells and fat block and thus reduce body weight and reduce the oxidation of fat and the level of tricipers in plasma blood and free fatty acids and cholesterol source, as well as the factor effect on cholesterol it's same effect on triglyceride<sup>(25)</sup>.

The reasons for moral improvement can be explained in the lipid of plasma in the green tea supplementation coefficients so green tea is currently used in the fight against obesity as it is used in lowering fat level and preventing excess weight<sup>(26)</sup>.

**Table 3: Effect of using green tea in broiler diet on cholesterol, HDL, LDL, VLDL and Triglyceride levels in blood plasma**

Treatment	Cholesterol (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	VLDL (mg/dl)	Triglyceride (mg/dl)
T1	115.24 ± 3.77 a	36.666 ± 3.272 c	25.0001 ± 1.71 a	53.514 ± 2.11 a	125.305 ± 8.57 a
T2	96.53 ± 1.30 b	63.0016 ± 0.909 a	16.839 ± 0.17 b	16.674 ± 1.83 b	84.196 ± 0.98 b
T3	78.106 ± 1.11 c	46.200 ± 0.590 b	14.868 ± 0.18 b	17.038 ± 1.40 b	74.341 ± 0.93 b
T4	74.495 ± 0.62 c	41.833 ± 0.792b c	15.019 ± 0.08 b	17.642 ± 0.83 b	75.098 ± 0.42 b
T5	55.708 ± 1.74 d	35.500 ± 2.432 c	14.775 ± 0.27 b	5.432 ± 1.87 c	73.878 ± 1.36 b
Significantly	**	**	**	**	**

The means with different letters within the same column are significantly between them, (P<0.01) \*\*

Observed from table (4) a highly decreased ( $P<0.01$ ) in plasma ALT levels in T5 compared to T4, T3, T2 and control, a highly significant ( $P<0.01$ ) in same trait for T3, T4 and T5 treatments compared with T2, however the results showed a highly decreased ( $P<0.01$ ) in plasma AST levels in T5 and T4 compared with T1, T2 and T3, <sup>(27)</sup> found that green tea in the laying hen diets significantly improved liver function by reducing concentration due to improvement moral in both ALT and AST, and this may be attributed that green tea reduced activity of ALT and AST and this improvement of ALT and AST due to green tea contain a high levels from antioxidant called polyphenols which has high antioxidant energy and which mainly works to inhibit free radical activity, inhibit disease and promote immune function, these materials possess high antioxidant energy which mainly works to inhibit free radicals and inhibition of cancer and heart disease and enhance immune function <sup>(5)</sup>, it has been found that consumption of green tea reduces plasma and LDL sensitivity to the oxidation process and regulates cholesterol metabolism<sup>(28)</sup>.

**Table 4: Effect of using green tea in broiler diet on ALT and AST enzyme levels in blood plasma**

Treatment	ALT (IU/L)	AST (IU/L)
T1	125.650 ± 2.362 a	12.666 ± 0.881 a
T2	114.116 ± 1.221 b	7.333 ± 0.494 b
T3	99.800 ± 1.321 c	6.000 ± 0.258 cb
T4	94.666 ± 1.364 c	4.183 ± 0.079 cd
T5	83.600 ± 1.279 d	3.550 ± 0.243 d
Significantly	**	**

The means with different letters within the same column are significantly between them ( $P<0.01$ ) \*\*

In general's green tea contain high levels of polyphenolic catechins (epigallocatechin, epigallocatechin gallate and epicatechin gallate), therefore regarded as a source of antioxidants. Nevertheless, the polyphenols found in GTEs are thought to provide health benefits beyond antioxidative mechanisms. For instance, green tea polyphenols are thought to interact with proteins and phospholipids in the plasma membrane, regulating signal transduction pathways, transcription factors, DNA methylation, mitochondrial function and autophagy <sup>(29)</sup>.

## CONCLUSION

From the results of this study we conclude that use green tea improvement in total protein, albumin, cholesterol, HDL, LDL, VLDL, Triglyceride, ALT and AST traits because it contain a high level of antioxidant compound.

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**Ethical Clearance:** The project was approved by the local ethical committee (College of Agriculture engineering science/ Baghdad University).

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# The Prevalence of Cesarean Section in Misan Province and It's Indicating Factors

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## ABSTRACT

**Background:** Cesarean sections increases the health risks for mother and infant as well as the costs of health care when they are compared with vaginal birth.

**Objectives:** Determine the prevalence of cesarean section (CS) in Misan province and its main indicating factors.

**Method:** Clinical records of all patients who underwent cesarean section were analyzed. Indications and the type of cesarean section (elective, emergency) were recorded.

**Results:** There were 5,109 deliveries during the study period, 1169 delivery was by cesarean section. The rate of CS was 22.88% (95%CI: 22.77 – 23.0%),, 52% had elective CS, and 49% had emergency CS. Women with age between (19-45) years, and multigravida (2 – 4 children) carried the highest rate of CS. The main indications for CS were a failure to progress in labor (29%), recurrent CS (24%), fetal distress (16%), malpresentation (14%). No maternal mortality recorded, but there was (5%) maternal morbidity in the form of postpartum hemorrhage.

**Conclusion:** The rate of CS in Misan province was higher than required by the WHO recommendation guidelines, but it is lower than that reported in the latest survey in Iraq (MICS6). The most common indications for cesarean section were a failure to progress in labor and previous cesarean section. The most common age for CS was between (19-45). Also, the history of multigravida represents half of the cases performing CS. A similar rate of elective and emergency CS. Low complication rate and low neonatal death.

**Keywords:** cesarean section, multigravida, postpartum hemorrhage, recurrent cesarean, low neonatal death

## INTRODUCTION

Cesarean section (CS) defined as the birth of a fetus through incisions in the abdominal wall (laparotomy) and uterine wall (hysterectomy) <sup>1</sup>. CS increase the health risks for mothers and infants as well as the costs of health care when they are compared with vaginal birth <sup>2</sup>.

CS performed for a vast array of indications including, labor dystocia, malpresentation such as breech or brow, cephalo-pelvic disproportion, fetal distress, or previous cesareans <sup>3</sup>. CS is a relatively common procedure in modern obstetric practice <sup>4</sup>, CS rates have increased over the past 40 years from approximately 5% to more than 30% in many industrialized countries <sup>5</sup>. CS rate is approximately 21.1% for the most developed regions of the globe, 14.3% for the less developed regions, and 2% for the least developed regions <sup>6</sup>. Recommendations of the world health organization (WHO) about optimal CS rates, addressing that the best outcomes of mothers and babies appear to occur with CS rates of 5% to 10%,

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while rates above 15% seem to do more harm than good<sup>7</sup>. However, CS rates vary worldwide, ranging from approximately 10% in Sweden to about 80% in private-sector hospitals in Brazil<sup>8</sup>. This epidemic is a reason for immediate concern and deserves serious international attention, the procedure is not benign and needs to be performed only when circumstances distinctly require it<sup>9</sup>. In Iraq, the overall rate of cesarean section increased remarkably from 18.0% in 2008 to 24.4% in 2012; the rate increased in all of the governorates during this period except Maysan. The increase was highest for Erbil, Basrah, Al-Sulaimaniya and Kirkuk with a relative change of 116.6, 90.8, 58.0 and 52.0%, respectively<sup>10</sup>. CS is associated with immediate and delay morbidity and mortality risk compared with vaginal deliveries. The complications divided into short-term which includes infection, hemorrhage, urinary tract or bowel problems, venous thrombosis and embolism<sup>11, 12</sup>, and long-term risks, which includes abnormal placentation, scar complications, uterine rupture, and adhesions<sup>13-16</sup>.

The study aims to determine the prevalence of cesarean section in Misan province and its indications, to establish a database of CS, and improves the quality of hospital care and ensures good health of mother and child to improve quality of life.

## PATIENTS AND METHOD

A descriptive study conducted in the two main hospitals in Misan province (Al-Sader teaching hospital, maternity and child hospital), during the period from 1<sup>st</sup> Aug 2017 to 30<sup>th</sup> Feb 2018. During the study period, 1,169 CS was done, of those 200 patients were selected.

The patients admitted as an emergency to the labor room or from the out-patient department as the elective case. The special questioner was prepared to collect the study information. This questioner consisted of demographic characteristics of women which includes (maternal age and gravidity), and questions regarding the CS which includes (time, the main indication, any intra-operative and postoperative complication, and perinatal outcome). According to their age, women were grouped into three categories: below 19 years, between 19-45 years, above 45 years. According to the gravidity, they were grouped into three categories: primigravida, multigravida (2-4), grand- multigravida (more than 5). According to the time of CS, they were grouped into two categories: emergency CS and elective CS. While the CS indications grouped into five main indications: failure

to progress, fetal distress, malpresentation, recurrent CS, and others, patients with any medical disease were excluded from the study.

Chi-square test used to perform the inference between the indications of CS and its type, the 95%CI of the prevalence was calculated using the formula:

$$95\% \text{ CI} = p \pm \frac{Z}{(\alpha/2)} \sqrt{\frac{p \cdot q}{n}}$$

In which  $p$  = prevalence of the disease,  $q = 1 - p$ ,  $z$  is normal score distribution,  $\alpha = 95\%$ ,  $n$  = total sample size. GraphPad Prism version 8.0.0 for Windows, GraphPad Software, San Diego, California USA, software package used to make the statistical analysis,  $p$ -value considered when appropriate to be significant if less than 0.05<sup>17</sup>.

## RESULTS

From all the (5,109) pregnant ladies presented to the hospitals for delivery during the period from 1<sup>st</sup> Aug 2017 to 30<sup>th</sup> Feb 2018, there were (1,169) deliveries ended by CS, representing a percent of (22.88%, 95%CI: 22.77–23.0%), with a rate of (7.8) caesarean section per day.

The most common age group was 19–45 years, half of the cases, regarding gravidity half of the cases had multigravida. Table 1 illustrate the indication (failure to progress was the most common) and type of CS (both emergency and elective show a similar ratio),

The only reported complication was Postpartum hemorrhage (PPH) with 10 cases (5%), they divided into primary (8 cases) and secondary (2 cases). Additionally, seven cases given a blood transfusion of those 2 cases used  $\geq$  four units of blood and 5 cases given  $<$ 4 units of blood.

**Table 1: Assessment of the demographic, maternal clinical characteristics and neonatal outcomes**

	Number	Percentage
<b>Age (years)</b>		
< 19	11	6%
19-45	188	94%
>45	1	0.5%
<b>Gravidity</b>		
Primigravida	35	18%
Multigravida	100	50%
Grand-multigravida	65	33%

Conted...

Indications of CS		
Failure to progress in labor	58	29%
Fetal distress	32	16%
Malpresentations	27	14%
Recurrent CS	48	24%
Others	35	18%
Type of CS		
Emergency	97	49%
Elective	103	52%
Perinatal outcome		
Preterm	1	1%
Full Term	189	95%

Conted...

Post-term	10	5%
Neonatal outcome		
Dead	2	1%
Alive	199	99%
Complications		
Postpartum hemorrhage	10	5%
Blood transfusion	7	3.5%

Figure 1 illustrates that according to the type of CS procedure the indication of CS is significantly different, in which in the emergency CS failure to progress in labor was the most common, while in the elective procedure recurrent CS was the most common.

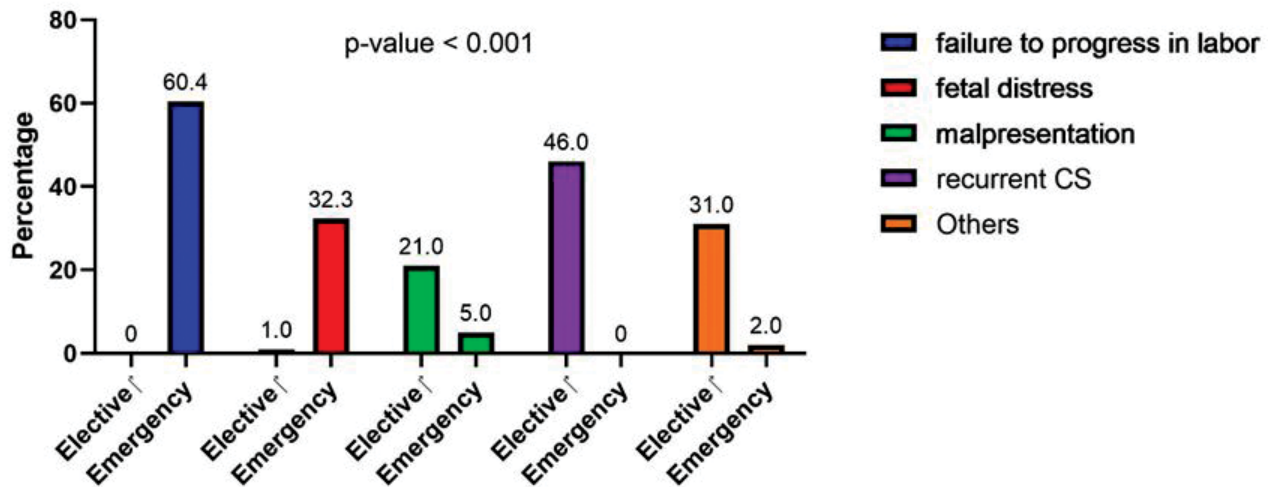


Figure 1: Indications for elective CS and emergency CS

## DISCUSSION

The problem of increasing family size still exists in many developing countries. Although CS can be a valuable intervention to mothers and infants, every effort should be made to decrease the CS rate because unnecessary CS are costly and potentially life-threatening<sup>18</sup>. The rate of CS in the current study was 23% in comparison with 17% in 2006<sup>19</sup>, 18.0% in 2008<sup>10</sup>, 24.4% in 2012<sup>10</sup>, and continue to increase to a rate of (33%) according to the Iraq Multiple Indicator Cluster Survey 2018 (Iraq MICS6)<sup>20</sup>, indicating an increase in the rate of CS.

It has been shown in a population and hospital-based studies of CS rates in 18 Arab countries, that Yemen, Mauritania, Sudan, and Algeria have CS rates

below 5%<sup>21</sup>. Almost 26% of Iraqi women giving birth at public hospitals do so via CS according to the 2010 health report for the Iraqi Health Ministry; and in 2012, the rate was further increased to 29.25%<sup>22</sup>.

In the USA and Canada, the national rates were almost 25% and 20%, respectively<sup>23, 24</sup>. In the United Kingdom, the rate reported as 13%<sup>25</sup>. WHO recommended guidelines stating that CS rates should range between 5 and 15 percent, adding that rates lower than five percent reflect women’s lack of access to life-saving care and levels more than 15 percent carry no additional benefits to mother or newborn<sup>26</sup>.

The study showed that two main indications for CS were failure to progress (29%) and recurrent CS (24%) this is similar to a study conducted in Saudi

Arabia<sup>27</sup>, and also similar to a study conducted in Iraq (2011), in which the main medical indication of CS was previous CS (25.9%)<sup>28</sup>. According to the international data, repeat cesareans and labor dystocia are the major indications for CS<sup>29</sup>. Malpresentation constituted about 14% of the causes in this study compared to 24.3% in another Iraqi study<sup>30</sup>. In the current study, 74% of the malpresentation was due to breech and 25% due to transverse lie. Successful external cephalic version during the antenatal period will prevent a lot of these operations. Fetal distress constituted about 16% of the causes in this study compared to 12.1% in another Iraqi study<sup>30</sup>.

Regarding the type of cesarean section, the current study showed similar rate between elective (52%) and emergency (48%) CS, which is a contrast to another study done in Hajjah, Yemen (2013) which revealed (79.3%) of cesarean sections were emergency<sup>31</sup>.

Regarding gravidity, multigravida women were half of the women, which is in agreement with an Indian study<sup>32</sup>. In the current study primigravida, women were (18%) in contrast to another study conducted in Egypt (2005) in which the rate was (36%)<sup>33</sup>. Grand-multiparity and pregnancy over the age of 35 years are common in the Iraqi society as shown in a study conducted at Al-Batool Maternity Teaching Hospital<sup>30</sup>.

The current study reported that 99% of babies delivered alive, which similar to another study conducted in Jordan (90.4%)<sup>34</sup>. Preterm babies were only (1%) of the total number in the current study which is different from an Indian study with 20% preterm infants<sup>32</sup>.

## CONCLUSIONS

The rate of CS in Misan province was higher than required by the WHO recommendation guidelines, but it is lower than that reported in the latest survey in Iraq (MICS6). The most common indications for cesarean section were a failure to progress in labor and previous cesarean section. The most common age for CS was between (19-45); also the history of multigravida represent half of the cases performing CS. A similar rate of elective and emergency CS. Low complication rate and low neonatal death.

**Conflict of Interest:** None

**Ethical Clearance:** Informed written consent obtained from all the participants in the study, and the study and all its procedure were done in accordance with the Helsinki Declaration of 1975, as revised in 2000. The study was approved by Gynecology & Obstetric department of Al-Sader teaching hospital, maternity and child hospital.

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# Role of Diffusion-Weighted MRI and Dynamic Contrast-Enhanced MRI in Early Staging of Bladder Cancer

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## ABSTRACT

**Objective:** study the role of Dynamic contrast-enhanced (DCE), and Diffusion-weighted (DWI) MRI for preoperative early staging of urinary bladder cancer and compare their diagnostic accuracy with histopathological diagnosis.

**Materials and Method:** Thirty-seven patients with bladder cancer included in this study. All patients underwent Magnetic Resonance Imaging (MRI) on a 1.5-T scanner. MR images were evaluated and assigned a stage which compared with the histopathological staging depending on transurethral resection of bladder tumor (TURBT).

**Results:** There was substantial agreement between DCE- and DWI-MRI for T staging ( $\kappa = 0.943$ ,  $p < 0.001$ ), both MRI modalities had similar specificity for diagnosing stage T1 bladder CA with DWI offered slightly higher sensitivity (SN), positive predictive value (PPV), negative predictive values (NPV) and accuracy. Both MRI modalities show fair specificity for stage T2 with DWI offered slightly higher specificity and similar sensitivity for both with good accuracy.

**Conclusion:** MRI is an excellent modality for preoperative early staging as well as grading of the bladder cancer. Both Diffusion-weighted MR imaging and dynamic contrast-enhanced MRI offer excellent agreement for T-staging of bladder cancer with DWI as the preferred modality without the use of contrast media.

**Keywords:** Bladder cancer, diffusion-weighted, dynamic contrast-enhanced. MRI, transurethral resection

## INTRODUCTION

Bladder tumors are the second most common tumor that can occur in the reproductive and urinary tract (prostate tumor is the most common)<sup>1</sup>, and when diagnosed in the early stages, it is highly treatable<sup>2</sup>. It accounts for 6-8% of overall malignancy in men and 2-3% in women and typically occurs in patients over the age of 50. They classified into either epithelial or nonepithelial (mesenchymal) tumor, on an average 90-95% of bladder neoplasms arise from the epithelium; the most common subtype is transitional cell carcinoma (90%)<sup>1</sup>.

Urothelial tumors are classified as either invading muscle (nonpapillary) or not invading muscle (superficial or papillary)<sup>3</sup>. Approximately 80%–85% of urothelial tumors are non-muscle invasive. These are low-grade lesions, can be multifocal, and arise from a hyperplastic epithelium. They generally have a good prognosis and rarely evolve into invasive cancer, although urothelial recurrence rates are about 50%. Approximately 20%–25% of bladder cancers are muscle invasive, arise from severe dysplasia or carcinoma in situ, and have a higher histologic grade. Non-muscle-invasive urothelial tumors have a higher rate of recurrence than do the muscle-invasive variety<sup>3</sup>. Mesenchymal tumors represent the remaining 5% of bladder tumors, with the most common subtypes being rhabdomyosarcoma, in children, and leiomyosarcomas, in adults<sup>4</sup>.

Magnetic resonance imaging (MRI) is the best imaging modality for bladder cancer local staging<sup>5</sup>. Currently, for local staging of bladder cancer, a

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multiparametric approach with conventional and functional sequences is useful<sup>6</sup>. Diffusion-weighted imaging (DWI) imaging provides both qualitative and quantitative information that reflects changes at the cellular level concerning tumor cellularity and cell membrane integrity. Most of the bladder tumors manifest as areas increased signal intensity on diffusion-weighted images with a reduced apparent diffusion coefficient (ADC) at quantitative analysis<sup>6,7</sup>. DW MRI, therefore, has the potential for monitoring treatment response to chemotherapy or radiotherapy with the identification of early non-responders who may benefit from a change in treatment approach<sup>8</sup>.

Dynamic contrast-enhanced (DCE)-MRI is a useful technique in which rapid enhancement of tumor by uptake of the contrast agent is compared to the bladder wall, assisting in differentiating tumor from surrounding normal tissue<sup>9</sup>. Dynamic MRI staging of bladder shows high accuracy in differentiating superficial tumors from invasive tumors and organ-confined tumors from non-organ-confined tumors of bladder<sup>10</sup>. The current study aimed to study the role of DWI- and DCE-MRI for the early staging of urinary bladder cancer and compare their diagnostic accuracy in correlation with histopathology.

## METHOD

A cross-sectional study conducted in the MRI unit of an oncology teaching hospital, Baghdad Medical city, the study involved 37 patients diagnosed as having bladder tumor (31 males and six females) with their age ranged from (41–78 years) in the period between January 2017 and December 2017.

Patients with recent bladder biopsy (<20 days), patient with bladder CA having radiological T-stage more than T2 (T3 and T4), patients with multiple bladder masses, patients with impaired renal function (abnormal glomerular filtration rate (GFR<90)), patients who received radio or chemotherapy and the common contraindication to MRI (pacemaker, metallic foreign body, etc.) excluded from the study. All the patients had histopathological confirmation of CA bladder by conventional cystoscopy and biopsy.

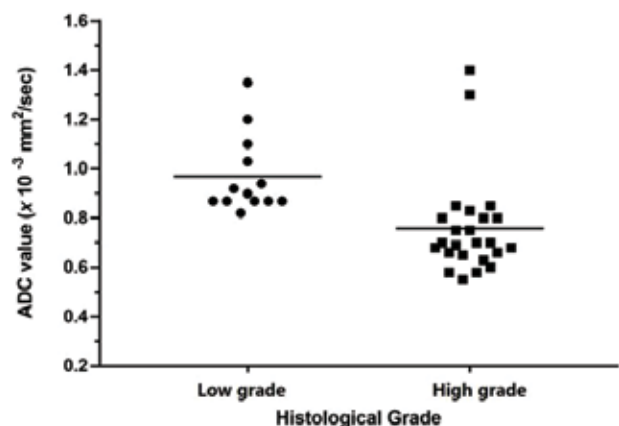
**MRI examination:** It was done using 1.5 Tesla MRI machine (Magnetom Aera, Siemens medical system, Germany) using body surface coil. The examination

was done in the supine position with adequate bladder distention by instructing the patient to start drinking water 30 minutes before MRI study. In patients with a urethral catheter, 250–400 ml sterile saline was used to distend the bladder. During the imaging procedure fullness of the bladder was checked at the localizer images and the examination delayed if the bladder was not full.

**Statistical Analysis:** The categorical data compared by applying a Chi-Square test; Independent unpaired student t-test was used to analyze the differences in the values of ADC at different pathological regions. Cohen's kappa analysis of agreement was used to assess the possible agreement (or disagreement), and its magnitude for similarity between 2 discrete variables. Receiver operator curve used to see the validity of different parameters in separating active cases from control. The statistical analysis was performed using SPSS 20.0.0, MedClac 14.8.1 software package. A  $P < 0.05$  considered statistically significant.

## RESULTS

The study included 37 patients with bladder cancer, mean age was  $61.59 \pm 8.89$  years, 83% were males, and 75.7% were smokers. The majority of cases (24 patients (64.9%)) had a high grade (III) of bladder cancer while 13 patients (35.1%) had a low-grade tumor. Mean ADC was significantly lower in patients with higher grade tumor compared to low grade ( $0.758 \pm 0.202$  vs.  $0.970 \pm 0.158$ ,  $p$ -value = 0.002), as illustrated in figure 1.



**Figure 1: dot plot of ADC vs. histological grade**

There was a substantial agreement between DCE and DWI in diagnosis of T-staging, as illustrated in table 1.



**Table 1: comparison of the agreement of both MRI methods (DWI and DCE) in T-staging of bladder cancer**

		DCE	
		T <sub>1</sub> (15)	T <sub>2</sub> (22)
DWI	T <sub>1</sub> (14)	14	0
	T <sub>2</sub> (23)	1	22
Kappa = 0.943, p < 0.001			

There is good agreement between DWI and DCE with TURBT, as illustrated in table 2.

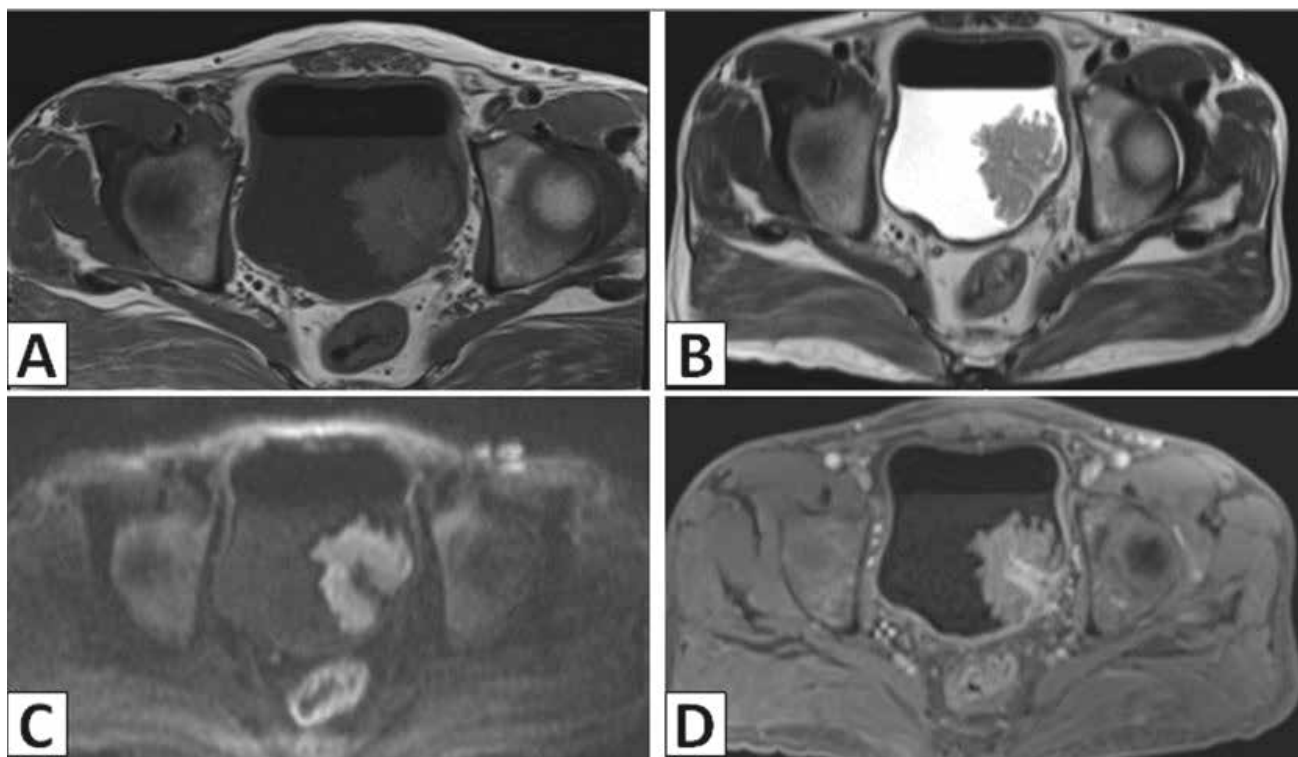
**Table 2: agreement between DWI and DCE and histopathological staging**

		TURBT	
		T <sub>1</sub> (19)	T <sub>2</sub> (18)
DWI	T <sub>1</sub> (15)	14	1
	T <sub>2</sub> (22)	5	17
Kappa = 0.677, p < 0.001			
DCE	T <sub>1</sub> (14)	13	1
	T <sub>2</sub> (23)	6	17
Kappa = 0.624, p < 0.001			

ROC analysis revealed diagnostic utility of DWI and DCE for diagnosing T1 and T2 staging, it revealed that both have similar SN, SP, AC, PPV and NPV, as illustrated in table 3. Figures 2 and three show images of some patients in this study.

**Table 3: Diagnostic efficacy of T staging by DWI and DCE based on histopathological T staging by TURBT**

		Sensitivity	Specificity	Accuracy	PPV	NPV
DWI	T <sub>1</sub>	73.7%	94.4%	83.8%	93.3%	77.3%
	T <sub>2</sub>	94.4%	73.7%	84.3%	77.3%	93.3%
DCE	T <sub>1</sub>	68.4%	94.4%	81.0%	92.9%	73.9%
	T <sub>2</sub>	94.4%	68.4%	81.8%	73.9%	92.9%



**Figure 2: pelvic MRI for a 51 years old male presented with painless hematuria. A and B: are axial T1WI and T2WI show intermediate SI mass seen in Lt posterior-lateral wall of UB. C: axial DWI shows the mass with restricted diffusion. D: immediate sequence of DCE T1 WI with fat suppression show moderately enhancing tumor. MRI stage I bladder cancer which is proved by histopathology**

## DISCUSSION

Correct staging of the bladder carcinoma especially in the pre-operative period is critical, the clinical spectrum of bladder cancer classified into three categories (these classes have different prognosis, management, and therapeutic decisions), first non-muscle invasive bladder cancer which is best treated using transurethral resection, secondly muscle-invasive bladder cancer with goals to determine the need for complete or partial cystectomy, and finally metastatic group<sup>11</sup>.

In the current study, about 91.9% of the patients were above 50 years, with a mean age at diagnosis 61.59 ± 8.89 years with a male to female ratio was 5.2:1, these findings were similar to previously reported studies<sup>1,12,13</sup>.

In this study, 51% of patients had non-muscle invasive, and 49% had an invasive muscle disease, these results were slightly higher than the results of previously reported studies regarding high prevalence of muscle-invasive disease<sup>14-18</sup>.

The current findings showed that 35.1% of the cases presented with low-grade bladder cancer and 64.9% with high-grade bladder cancer, these results were similar to a previously reported study in Iraq which show that 63.27% having muscle-invasive and 42.9% had grade II disease, and 44.9% had grade III disease<sup>19</sup>, Sfakianos et al.<sup>20</sup> study showed that 75.3% had high-grade tumor, Divrik et al.<sup>16</sup> study revealed 78.7% had high grade, and Herr et al.<sup>17</sup> study revealed 97.3% had high-grade tumor, on the other hand, Gupta et al.<sup>1</sup> study show different results with 41.7% had low grade and 25% presented with high grade. This disagreement between different studies can be attributed to the difference in social, environmental and genetic predisposing in the different population.

In the current study both DWI and DCE show almost perfect agreement ( $\kappa = 0.943$ ) with T staging using transurethral resection, both MRI modalities showed excellent specificity (94.4% for DWI and 94.4% for DCE), good sensitivity (73.7% and 68.4% sensitivity), and accuracy (83.8% to 81.0%) for T1 staging, these findings were similar to that reported by Gupta et al.<sup>(13)</sup> which reported 100% specificity, 62.5% sensitivity, 90% accuracy for both DCE and DWI in diagnosing T1 disease, with both MRI modality showing substantial agreement with histopathological staging, Tuncbilek et al.<sup>21</sup> reported an accuracy of 62.5%, Tekes et al.<sup>22</sup> reported 62% accuracy.

In the current study both DWI and DCE show 94.4% sensitivity of T2 staging and fair specificity (73.7% and 68.4%), which was in agreement with Gupta et al.<sup>1</sup> in which the specificity was 72.2%, while the sensitivity was 83.3% and 91.7% (DCE and DWI). DWI MRI provides information on diffusion in any organ and can be used to differentiate normal and abnormal structures of any tissues better, and it might help in the characterization of various abnormalities. DW MRI of the urinary bladder seems to be a feasible and reliable method to diagnose bladder carcinoma<sup>23</sup>.

## CONCLUSIONS

MRI is an excellent modality for preoperative early staging as well as grading of the bladder cancer. Both Diffusions weighted MR imaging, and dynamic contrast-enhanced MRI offers excellent agreement for T-staging of bladder cancer with DWI preferred without the use of contrast media.

**Conflict of Interest:** None

**Ethical Clearance:** Informed written consent was obtained from all the participants in the study, and the study and all its procedure were done in accordance with the Helsinki Declaration of 1975, as revised in 2000. The study was approved by the oncology teaching hospital, Baghdad Medical city.

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# Effect of Gender on Difficulties in Laparoscopic Cholecystectomy

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## ABSTRACT

**Background:** Cholecystectomy is one of the most commonly performed abdominal surgical procedures, there is a possible association between gender and Laparoscopic Cholecystectomy complications.

**Objective:** Assessment of the relationship between gender and Laparoscopic Cholecystectomy complications.

**Material and Method:** a retrospective study involved 160 patients (130 females and 30 males) were examined, patients' age, gender, and surgical complication were collected (type of inflammation, Anatomical difficulties in resection, Perforation during the operation, Conversion to open cholecystectomy and Omental and organ adhesions to the gallbladder).

**Results:** results showed that multiple gallstones with chronic inflammation in male 26.6% and female were 11.5%, also severe difficulties in anatomic resection in male's 33.3% whereas in females 10%. Mild difficulty in resection in female 38.5%, but in the male, it was 3.3%. In perforation during laparoscopy in male was zero & in female was 2.3%. In conversion to open cholecystectomy in the male patients it was 16.7%, but in female was 1.5%. In adhesions to surrounding structures in the male it was 36.7%, in the female it was 18.5% with no adhesions in female was 73.1%, in the male, it was 50%.

**Conclusion:** Some laparoscopic cholecystectomy complications appear to be more prevalent in male compared to female (Conversion to open cholecystectomy and Anatomical difficulties in resection), while others appear to have similar laparoscopic cholecystectomy complications between males and females.

**Keywords:** laparoscopy, gallstones, gender, perforation, adhesions

## INTRODUCTION

Cholecystectomy is one of the most commonly performed abdominal surgical procedures, and in developed countries, many are performed laparoscopically. As an example, 90 percent of cholecystectomies in the United States are performed laparoscopically<sup>1</sup>. Laparoscopic cholecystectomy is considered the "gold standard" for the surgical treatment of gallstone disease. This procedure results in less postoperative pain, better cosmesis, and shorter hospital stays and disability from work than open cholecystectomy<sup>2</sup>. However, the overall serious complication rate in laparoscopic cholecystectomy remains higher than that seen in open cholecystectomy<sup>3,4</sup>.

Few clinical studies were performed to compare this new procedure to standard open cholecystectomy. As laparoscopic cholecystectomy gained wider acceptance, complications that were rarely seen with open cholecystectomies, such as bile duct injury, were reported

in as many as five percents of patients<sup>5</sup>. At present, approximately 750,000 laparoscopic cholecystectomies are performed annually in the United States (accounting for roughly 90 percent of all cholecystectomies) with an overall serious complication rate that remains higher than that seen in open cholecystectomy, despite increasing experience with the procedure<sup>3,4</sup>. The complication rate of open cholecystectomy has increased as well, due to overall declining experience in open surgery as this approach is now reserved for the most complicated and challenging cases<sup>6</sup>. The aim of the current study to establish the relationship between gender and Laparoscopic Cholecystectomy complications.

## MATERIAL AND METHOD

A total of 160 patients included in this study; it was carried out in Al-Zahrawi Private Hospital, Mosul, Iraq; from the period of 1<sup>st</sup> January 2017 to 1<sup>st</sup> January 2018. The data obtained from case sheets of the patients including symptoms, signs, and investigations

In this retrospective study, 130 females and 30 males were examined, patients' age, gender, and surgical complication were collected (type of inflammation, Anatomical difficulties in resection, Perforation during the operation, Conversion to open cholecystectomy and Omental and organ adhesions to the gallbladder).

Type of inflammation divided into Double gallstones with chronic inflammation. Multiple gallstones with chronic inflammation, severe acute inflammation, and severe chronic inflammation. Anatomical difficulties in resection divided into very difficult, moderate difficulty and mild difficulty. Omental and organ adhesions to the gallbladder divided into Adhesions to the omentum, adhesions to surrounding structures, adhesions to between Omentum, duodenum, colon, and anterior abdominal wall and no Adhesions.

### STATISTICAL ANALYSIS

Analysis of our data done using the software program: SPSS 21 (Statistical Package for Social Sciences). Numeric data were represented by the mean  $\pm$  standard error, while the categorical data represented by numbers and percentages. For studying the association

between categorical data, the Chi-Square test or Fisher exact test used. The significant level considered when the P value  $< 0.05$ <sup>7,8</sup>.

### RESULTS

Table 1 describes age distribution according to gender. Concerning anatomical\difficulties in resection mild difficulties were significantly higher in female compared to male, while very difficult was significantly higher in males compare to females, Conversion from laparoscopy to open cholecystectomy was significantly higher in males compared to females, the rest of the complications show no significant difference between gender, as illustrated in table 2.

**Table 1: Comparison between patients with appendicitis and ovarian cyst**

Items	Male	Female	p-value
Number	30	130	-
<b>Age group</b>			
< 40 years	19 (63.3)	75 (57.7)	0.572
$\geq$ 40 years	11 (36.7)	55 (42.3)	

**Table 2: association between gender and Laparoscopic Cholecystectomy complications**

Items	Male	Female	p-value
Number	30	130	-
<b>Type of inflammation, n (%)</b>			
Double gall stones with chronic inflammation	18 (60.0)	95 (73.1)	0.206
Multiple gallstones with chronic inflammation	8 (26.6)	15 (11.5)	
Severe acute inflammation	2 (6.7)	9 (6.9)	
Severe chronic inflammation	2 (6.7)	11 (8.5)	
<b>Anatomical difficulties in resection, n (%)</b>			
Negative	14 (46.7)	47 (36.2)	<0.001
Very difficult	10 (33.3)	13 (10.0)	
Moderate difficulty	5 (16.7)	20 (15.4)	
Mild difficulty	1 (3.3)	50 (38.5)	
Perforation during the operation, n (%)	0 (0)	3 (2.3)	1.0
Conversion to open cholecystectomy, n (%)	5 (16.7)	2 (1.5)	0.003
<b>Omental and organ adhesions to the gallbladder, n (%)</b>			
Adhesions to omentum	0 (0.0)	2 (1.5)	0.936
Adhesions to surrounding structures	11 (36.7)	24 (18.5)	
Adhesions to between tissues	4 (13.3)	9 (6.9)	
No Adhesions	15 (50.0)	95 (73.1)	
Chi-square test and Fisher exact test used			

## DISCUSSION

Some studies have shown that severe fibrosis and anatomical anomalies are more common in male than female, so laparoscopy is more difficult. In the current study anatomical difficulties in resection, mild difficulties were significantly higher in female compared to male, while very difficult was significantly higher in males compare to females, Conversion from laparoscopy to open cholecystectomy was significantly higher in males compared to females, the rest of the complications show no significant difference between gender. Akcakaya et al. reviewed 915 patients retrospectively with symptomatic cholelithiasis, the patients divided two groups, group 1 is male, and group 2 is female. The average duration of surgery in group 1 was (20- 160) minutes and in group 2 was (15- 135) minutes. The conversion rate between group 1 and group 2 was significantly different ( $P < 0.05$ ). Inflammatory findings (acute or chronic) in resected gallbladder between groups 1 and 2 were significantly different ( $p < 0.0001$  and  $p < 0.05$ , respectively). The frequency of adhesions between the gallbladder and omentum and other organs was higher in male ( $p = 0.003$  and  $p = 0.0006$ , respectively). The anatomical difficulty was more prominent in male patients ( $p < 0.0001$ ). These findings were partially in agreement in the current study.

Lein and Huang studied the effect of male gender on the clinical presentation of symptomatic cholelithiasis, and they found that the male/female ratio increased (in the patient group sequence of simple Laparoscopic cholecystectomy (LC), acute LC, acute open, and acute conversion group), in the acute LC group male patients had significantly ( $p = 0.04$ , t-test) longer operating time than females, these findings similar to the current study in which male gender show more complications than female<sup>9</sup>. These findings were also reported by Târcoveanu et al.<sup>10</sup>, Bazoua and Tilston<sup>11</sup>.

## CONCLUSION

Some laparoscopic cholecystectomy complications appear to be more prevalent in male compared to female (Conversion to open cholecystectomy and Anatomical difficulties in resection), while others appear to have similar laparoscopic cholecystectomy complications between males and females.

**Conflict of Interest:** None

**Ethical Clearance:** Informed written consent was obtained from all the participants in the study, and the study and all

its procedure were done in accordance with the Helsinki Declaration of 1975, as revised in 2000. Approved by the Al-Zahrawi hospital, department of surgery.

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# Effects of Empowerment and Work Environment on Job Satisfaction of Nurse-midwives working in Hospitals

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## ABSTRACT

**Purpose:** The purpose of this study was to provide basic data needed to develop programs to improve job satisfaction for nurse-midwives by analyzing factors affecting job satisfaction.

**Method:** The study was a descriptive study where the data were collected using questionnaires from 136 nurse-midwives and analyzed by frequency, percentage, mean, standard deviation, t-test, ANOVA, Pearson's correlational coefficients and stepwise multiple regression.

**Results:** Job satisfaction according to general characteristics and job characteristics of nurse-midwives showed a significant difference according to age, hospital type, career of nurse, monthly income, and reason for going to the current hospital. Job satisfaction of nurse-midwives was positively correlated with empowerment ( $r=.59, p<.001$ ) and work environment ( $r=.60, p<.001$ ). The factors affecting job satisfaction of nurse-midwives were work environment ( $\beta=.54, p<.001$ ) and empowerment ( $\beta=.41, p<.001$ ), and the total explanatory power was 59.4%.

**Conclusion:** As the factors affecting job satisfaction of nurse-midwives have been identified as work environment and empowerment, hospital leaders should support the nurse-midwives that are registered according to medical law to create a work environment suitable for job performance and fulfill their duties faithfully.

**Keywords:** Nurse-midwives, Empowerment, Work environment, Job satisfaction, Hospital

## INTRODUCTION

In Korea, according to the Article 6 of the Medical Law, after having passed a national examination through training such as education and practice at a medical institution for prenatal care for one year with the license of a nurse, the nurse-midwives are licensed. According to Article 2 of the Medical Law, nurse-midwife's duty is to provide health and well-being guidance for preterm delivery, pregnancy, marital division, postpartum and newborn infants.<sup>1</sup> Therefore it can be said that nurse-

midwife is experts who can cooperate with other medical professionals and perform health care of pregnant women and babies efficiently and competently at all places.

On the other hand, today, pregnant women tend to want to have babies in hospitals rather than maternity centers, and with the sudden drop in birth rates due to low birthrates, and most nurse-midwives want to work as nurse-midwives or nurses in maternity wards, newborn units, etc. It is therefore necessary to analyze how satisfied nurse-midwives are in performing their jobs in the hospital.

Job satisfaction refers to how satisfied an individual is with a job<sup>2</sup> and this is not only an important indicator in predicting organizational performance.<sup>3</sup> In particular, it was reported that higher job compensation, which is directly related to job performance, is associated with higher job satisfaction.<sup>4</sup> In a previous study of hospital

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nurses, empowerment and job satisfaction of nurses were positively correlated<sup>5</sup> and work environment and job satisfaction were also positively correlated<sup>6</sup> where the more nurses' awareness of their empowerment and the better the work environment, the higher the job satisfaction. In nursing organizations, empowerment leads to positive changes in the attitudes and behaviors of organizational members by increasing the capacity of nurses and spreading their power into nursing organizations.<sup>7</sup> These changes also were reported to have positive effects on job satisfaction increase,<sup>8</sup> decrease in turnover intention,<sup>9</sup> and organizational effectiveness improvement.<sup>10</sup>

Also, it was reported that the work environment is the main factor that decides turnover intentions of the hospital, and many factors affect the work environment in the hospital, such as relationships with health care providers, patient populations, patient-to-nurse ratios, and ward placement.<sup>11</sup> Like nurses, nurse-midwives should also be able to faithfully fulfill their duties while perception that they are motivating their internal work and performing important job values in a proper work environment. However, there is no study of empowerment and awareness of work environment and job satisfaction for nurse-midwives so far.

For this the researches of the study aimed to analyze the factors affecting job satisfaction, to improve the empowerment of nurse-midwives, to create desirable nursing work environment and to provide basic data to increase job satisfaction.

### **Purpose**

1. Identify difference of job satisfaction according to general characteristics and working characteristics of nurse-midwives.
2. Identify degree of empowerment, work environment and job satisfaction of nurse-midwives.
3. Identify correlation between empowerment, work environment and job satisfaction of nurse-midwives.
4. Identify factors that affect job satisfaction of nurse-midwives.

## **MATERIALS & METHOD**

**Research design:** This study is a descriptive research study to identify factors affecting job satisfaction.

**Subjects:** For the study, convenient sampling was performed on nurse-midwives working at a total of 10 hospitals in S city (5), D city (1), and B city (4), from September to November 2016. The data collection was submitted to the director of the institution concerned and the department concerned with the research plan including the purpose and method of the research and requested cooperation. The purpose of the study, method, participation, and autonomy of withdrawal were explained to the subjects and received the written consent of those who agreed to participate in the study. For the number of samples for this study, using G\*power 3.1 program, 150 were recruited considering 20% dropout rate at 123 calculated from statistical power (1- $\beta$ ) .90, significance level  $\alpha$ =.05 in two-sided test, and mild effect size .30, and a total of 136 were used for the final analysis except for 17 with incomplete or insincere responses.

### **Instruments**

**Empowerment:** The study utilized 12 items on semanticity, competence, self-determinism, and effectiveness which are motivation and psychological factors of Thomas & Velthouse developed by Spreitzer and modified by Chung<sup>12</sup> was used. Each item is in a 5-point scale, where higher scores represent higher empowerment. The reliability in the study was Cronbach's  $\alpha$ =.93.

**Work environment:** The study utilized 21 items in Korea Practice Environment Scale of the Nursing Work Index developed by Lake and adapted by Cho et al.<sup>13</sup>. The tool consists of five sub-factors, and each item is in a 4-point scale, where higher scores represent higher evaluation of professional work environment. The reliability in the study was Cronbach's  $\alpha$ =.89.

**Job satisfaction:** The study utilized 21 items from the tool by Slavitts et al. modified and supplemented by Kim<sup>14</sup>. Each item is in a 5-point scale, where higher scores represent higher job satisfaction. The reliability in the study was Cronbach's  $\alpha$ =.87.

**Ethical Consideration:** The research plan was submitted to the IRB of S University and the approval (1041449-201606-HR-002) was received before the study. The consent to participate in the study included the purpose of the study, the procedures of participation, the risks and benefits of participating, and personal information and confidentiality, and made it possible for the subjects

to participate in the research voluntarily. If the subject voluntarily agreed to participate in the study, the subject signed the agreement before participating in the questionnaire. In order to protect personal information, the questionnaires were sealed in envelopes immediately after completing the questionnaires then submitted.

**DATA ANALYSIS**

The data were analyzed using SPSS WIN 21.0 program.

1. Job satisfaction differences according to general characteristics and job characteristics of nurse-midwives were analyzed by t-test, ANOVA and post-analysis was performed using Scheffe test.
2. For variables of nurse-midwives, mean and standard deviation were obtained.
3. The relationship among variables was analyzed by Pearson’s correlation coefficient.
4. The factors affecting job satisfaction were analyzed by multiple regression analysis.

**FINDINGS**

**General Characteristics and Job Characteristics of Nurse-midwives and the Difference in Job Satisfaction:** Among the general characteristics of

nurse-midwives, 44.9% were from 40 to 49 years. Marital status was 71.7% for married and in education, it was 74.6% for college graduation. Among the job characteristics of the subjects, in hospital type, 48.6% was 2nd general hospital and 44.2% was special hospital. For career of nurses, 56.5% were under 10 years, for career of nurse-midwives, 32.6% were under 10 years, and 73.9% had under 10 years of experience in the current department. The most common average monthly income was less than 2,500,000-3,000,000 won (39.9%) For position, 52.2% were head nurses or higher positions, and 66.7% were in the maternity and pediatrics department. For reason for going to the current hospital, there were in favor of the hospital 56.5%. In parts that need improvement in the hospital, there were discontent working environment or welfare benefits 26.1%.

For job satisfaction based on general characteristics and job characteristics of nurse-midwives, there were significant differences according to age ( $F=5.14, p=.002$ ), hospital type ( $F=3.37, p=.037$ ), career of nurse ( $F=2.78, p=.044$ ), monthly income ( $F=3.52, p=.017$ ), and reason for going to the current hospital ( $F=4.17, p=.018$ ).

**Degree of Empowerment, Work Environment and Job Satisfaction of Nurse-midwives:** The empowerment level of nurse-midwives was found to be  $48.02 \pm 6.41$ , and work environment was  $60.63 \pm 8.84$ , and job satisfaction  $72.07 \pm 8.66$  <Table 1>.

**Table 1: Degree of Empowerment, Work Environment, Job Satisfaction (N = 138)**

Variables	Mean ± SD	Possible range	Actual range
Empowerment	48.02 ± 6.41	12-60	30-60
Work environment	60.63 ± 8.84	21-84	42-80
Job satisfaction	72.07 ± 8.66	21-105	52-96

**Relationship between Empowerment, Work Environment and Job Satisfaction of Nurse-midwives:** Job satisfaction was positively correlated with empowerment ( $r=.59, p<.001$ ), and it was found to have positive correlation with work environment ( $r=.60, p<.001$ ) <Table 2>.

**Table 2: Correlation among Empowerment, Work Environment, Job Satisfaction (N = 138)**

Variables	Empowerment	Work environment	Job satisfaction
	r (p)	r (p)	r (p)
Empowerment	1		
Work environment	.36 (<.001)	1	
Job satisfaction	.59 (<.001)	.60 (<.001)	1

**Factors Affecting Job Satisfaction of Nurse-midwives:**

To analyze the factors affecting job satisfaction of nurse-midwives, the study conducted a stepwise regression analysis of the variables that showed significant differences in empowerment, work environment, general characteristics, and job satisfaction, including age, hospital type, career of nurse, monthly income, and reason for going to the current hospital. In order to verify the hypothesis of independent variables of multiple regression analysis, it was found that there was no problem of multicollinearity, as the regression analysis

had a tolerance range of .911 and a dispersion expansion coefficient of 1.098. In addition, the Durbin-Watson value was calculated to verify the independence of the residuals. As a result, it was 1.671, which is close to 2, confirming that there is no autocorrelation. Regression model fit was significant at  $F=85.62(p<.001)$ .

The factors affecting job satisfaction of nurse-midwives were found to be work environment ( $\beta=.54, p<.001$ ) and empowerment ( $\beta=.41, p<.001$ ), and total explanatory power was 59.4% <Table 3>.

**Table 3: Multiple regression analysis for Influence factors associated with Job Satisfaction****(N = 138)**

Variables	B	S.E.	$\beta$	t (p)	Adjusted R <sup>2</sup>	F(p)
Constant	11.17	4.71		2.37(.019)		
Work environment	.56	0.06	.54	8.73(<.001)	.434	
Empowerment	.57	0.09	.41	6.69(<.001)	.587	85.62 (<.001)
R <sup>2</sup> =.594, Adj. R <sup>2</sup> =.587, F=85.62, P<.001						

**DISCUSSION**

According to the results of the study, job satisfaction according to general characteristics and job characteristics of nurse-midwives was significantly different according to age, hospital type, career of nurse, monthly income, and reason for going to the current hospital. Job satisfaction of nurse-midwives over 30 and 50 years old was high, nurse-midwives working in special hospitals were highly satisfied, those with 20-29 years career of nurse had high job satisfaction, and job satisfaction was higher when monthly income exceeded 3 million won. For the reason for working at the current hospital, the group that favored the hospital had higher job satisfaction than the group that had intimate relations with colleagues.

Direct comparison is difficult because of the lack of research on nurse-midwives. However, the study aims to discuss using study results on nurses, a similar medical professional. The study result was similar to another study where nurses working at care facilities showed higher job satisfaction in age group between 51 to 60<sup>8</sup>. In addition, Koh<sup>15</sup> reported that job satisfaction was higher in the age group of 40 years or older, and job satisfaction was higher in the group with 20 or more years of work experience than in the group with 3-5 years of experience, which was similar to the study results.

In addition, job satisfaction is considered to be higher in nurse-midwives working in women's special hospitals because they are more likely to perform maternity-related tasks with better conditions than nurse-midwives in general hospitals. It was similar to the study results<sup>6</sup> where nurses with 15 years or more of experience had higher job satisfaction than those with fewer years of experience, and it is thought that with more years of experience, it is possible to reduce job burden and increase satisfaction with higher expertise and competence. Also, as income is higher with experience and work at preferred hospitals can increase job satisfaction, there should be adequate establishment of work environment for continued performance of maternity -related tasks.

The empowerment of nurse-midwives was 48 points out of 60 points, the work environment was 60 points out of 84 points, and job satisfaction was 72 point out of 105 points, showing above-average levels. This was somewhat higher in the study by Ko<sup>6</sup> than in the work environment perception and job satisfaction scores. This implies that nurse-midwives' intensive education and high professionalism led to these results even though nurse-midwives are working in the same environment as hospitals rather than nurses. Therefore, it is crucial to create environments where nurse-midwives can perform their legal tasks smoothly.

The empowerment of nurse-midwives, work environment and job satisfaction were positively correlated. In addition, factors affecting job satisfaction of nurse-midwives were explained by work environment and empowerment, with 59.4% explanatory power. This matches the results<sup>5</sup> of positive correlation between environment and job satisfaction in hospital nurses and results<sup>6</sup> showing positive correlation between work environment and job satisfaction in general hospital nurses. Nurses and nurse-midwives working at hospitals have higher job satisfaction with higher empowerment and better recognition of working environment, and therefore it is necessary to provide resources and support as well as opportunities and information to increase empowerment. In addition, there needs to be provision of an environment where nurse-midwives can participate in hospital policy, establish foundation to guarantee quality of maternity management, establish abilities, leadership, and support systems for leaders, and communicate smoothly with other medical professionals with ample manpower and resources. Because work environment and empowerment explained job satisfaction by 59.4%, it is necessary to conduct studies to analyze the factors influencing other factors. There is also a lack of studies on nurse-midwives and private nurse-midwives, and continuous research is needed.

**Conflict of Interest and Source of Funding:** The authors declared of interest.

**Source of Funding:** Selves

**Ethical Clearance:** The data of study was analyzed after review and approval of IRB in S University. (1041449-201606-HR-002)

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# Effectiveness of the Smoking Stop Model to Improve the Rehabilitative Behavior of Adolescent Smokers

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## ABSTRACT

Rehabilitative behavior of smokers behavior makes the body's system work continuously to reduce damage caused by a mixture of toxic and carcinogenic substances that enter the body during smoking. There are short-term and long-term benefits of stopping smoking. After two days of smoking cessation, nicotine left in the body is released, and the taste and smell improves, then. After a week, the heart pumps blood that is richer in oxygen. After two months, the bones become stronger and denser. After two and a half months, the skin becomes smoother, the hair becomes healthier and the teeth become whiter. After four months, coughing and shortness of breath are reduced. This research was conducted in 2017 in South Jakarta and Depok, Indonesia. This type of research is quasi-experimental using treatment groups and control groups. The respondents involved were 30 students from Junior High School X Jakarta as a treatment group and 30 students from Junior High School Y Depok as a control group. The treatment given is the 'smoking stop model', namely blended model community based, self efficacy, and cognitive behavior. Furthermore, the effectiveness of the model will be studied to improve the rehabilitative behavior of adolescent smokers. To prove the effectiveness of the treatment, data analysis was performed using the Ancova test. The results of the study show that the smoking stop model is effective for improving smoking rehabilitative behavior of junior high school students.

**Keywords:** *Smoking stop model, Adolescent, Rehabilitative behavior*

## INTRODUCTION

The Government of Indonesia through the Ministry of Health has launched a healthy community movement, namely: doing physical activities, eating vegetables and fruit, not smoking, not consuming alcohol, checking health regularly, cleaning the environment, and using latrines<sup>(1)</sup>. Several studies on smoking behavior have been carried out such as: The success of community-based<sup>(2)</sup>, Smoking cessation and weight changes over 9 years in a community-based cohort study<sup>(3)</sup>, and Community Based/CTC that shows excellent recovery and coverage<sup>(4)</sup>. Through the cognitive behavior model, through family/community education and involvement, 89% of participants who had a history of smoking

behavior had stopped smoking during the follow-up period, and 86% of people stopped smoking before the basic examination.

Rehabilitative behavior of smokers makes the body's system work continuously to reduce damage caused by a mixture of toxic and carcinogenic substances that enter the body during smoking. There are short-term and long-term benefits of stopping smoking. After two days of smoking cessation, nicotine left in the body is released, and the taste and smell improves, then. After a week, the heart pumps blood that is richer in oxygen. After two months, the bones become stronger and denser. After two and a half months, the skin becomes smoother, the hair becomes healthier and the teeth become whiter. After four months, coughing and shortness of breath are reduced<sup>(5)</sup>.

Referring to the explanation above, it is necessary to make a 'smoking stop model', namely a non-smoking movement in a unit of health education by involving young smokers as targets and family/people/teachers as monitors.

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**MATERIALS AND METHOD**

This research was conducted in 2017 in South Jakarta and Depok, Indonesia. This type of research is quasi-experimental using treatment groups and control groups. The respondents involved were 30 students from Junior High School X Jakarta as a treatment group and 30 students from Junior High School Y Depok as a control group. The treatment given is the ‘smoking stop model’, namely blended model community based, self efficacy, and cognitive behavior. Furthermore, the effectiveness of the model will be studied to improve the

rehabilitative behavior of adolescent smokers. To prove the effectiveness of the treatment, data analysis was performed using the Ancova test.

**FINDINGS**

The results of data analysis (Table 1) show that there was no difference of age and knowledge about smoking between the treatment group and the control group (p-value > 0.05). In other words, before being given treatment, the two groups are equal.

**Table 1: Equality of age and knowledge about smoking between the treatment and control groups**

Variable	Group	n	Mean	Median	SD	Min-Max	p-value
Age	Treatment group	30	14	14	0.983	12-16	0.526
	Control group	30	13.87	14	1.042	12-16	
Knowledge about smoking	Treatment group	30	14.90	15	2.279	7-19	0.376
	Control group	30	13.26	13.5	2.242	10-18	

The results of data analysis (Table 2) show that there was no difference of grade of school, the presence of household smokers, sources of exposure, duration of smoking and places to get cigarettes between the treatment group and the control group (p-value > 0.05). In other words, before being given treatment, the two groups are equal.

**Table 2: Equality of grade of school, the presence of household smokers, sources of exposure, duration of smoking and places to get cigarettes**

Variable	Treatment group		Control group		p-value
	n	%	n	%	
<b>Grade of School</b>					
7 <sup>th</sup> grade	9	30	10	33.3	0.951
8 <sup>th</sup> grade	11	36.7	10	33.3	
9 <sup>th</sup> grade	10	33.3	10	33.3	
<b>The presence of household smokers</b>					
Only me	4	13.3	7	23.3	0.548
Brother	3	10	2	6.7	
Father	16	53.4	11	36.7	
Father and brother	4	13.3	6	20	
Grandfather	1	3.3	-	-	
There is no	2	6.7	4	13.3	

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<b>Sources of exposure</b>					
Mass media	13	43.3	18	60	0.350
I tried it myself	11	36.7	8	26.7	
Forced	4	13.3	1	3.3	
Never	2	6.7	3	10	
<b>Duration of smoking</b>					
< 1 week	11	36.7	8	26.7	0.192
< 2 weeks	5	16.7	2	6.7	
< 3 weeks	1	3.3	-	-	
< 4 week	3	10	1	3.3	
> 1 month	5	6.7	6	20	
Never	5	6.7	13	43.3	
<b>Places to get cigarettes</b>					
Take from family	1	3.3	4	13.3	0.069
Friends	6	20	-	-	
Brothers	1	3.3	-	-	
Buy in a shop	17	56.7	13	43.3	
Never	5	16.7	13	43.3	

**Table 3: Differences in rehabilitative behavior scores, health status and cognitive function between the treatment and control groups, after being given treatment**

Variable	Group	Mean	SD	95% CI	F	P-value
Rehabilitative behavior	Treatment group	0.833	1.288	1.916-0.283	0.155	<b>0.049</b>
	Control group	0.266	1.818			
Health status	Treatment group	0.166	0.379	4.737-1.403	3.504	0.066
	Control group	1.500	8.215			
Cognitive function	Treatment group	0.300	1.643	2.246-1.312	1.557	0.217
	Control group	0.766	4.583			

The results of the analysis showed that there were differences in rehabilitative behavior of smoking (p-value < 0.005), after the exercise program was conducted.

## DISCUSSION

It was found information that the majority of adolescent smokers were 8th grade students, aged 13-14 who were at risk of trying to smoke. This condition is a trigger as well as an amplifier of conditions that occur in adolescents who smoke. The results of expert research show that mothers and siblings who smoke are associated with initiations that occur during daily interactions. This is a significant risk factor for initiating smoking behavior<sup>(6)</sup>.

Meanwhile, the results of the data analysis concluded that the stop smoking model had no effect on the health status and cognitive function of adolescents. In other words, adolescents continue to behave smoking even though teenagers already know about the dangers of smoking.

It is often found that adolescent smokers have difficulty stopping their smoking habits, when they want to quit smoking. Even one study reported that it took 6 months for interdisciplinary intervention programs "Cognitive Behavior (CB)" by completing intensive program for 3 weeks, smokers will succeed effectively<sup>(7)</sup>.

The results of another study reported that seven out of eight cognitive attributions for smoking were associated with subsequent smoking behavior (p-value <0.05). Curiosity, autonomy, social image, social ownership, and handling affect the initial stages of smoking, while mental improvement and involvement affect the next stage of smoking. Curiosity, autonomy, social image, and mental improvement precede the development of smoking; social ownership prevents smoking regression; and the handling and involvement of both precedes the development of smoking and prevents smoking regression. This study shows that differences in cognitive attribution affect smoking at different stages in different ways. This finding can inform the smoking prevention and cessation program<sup>(8)</sup>.

## CONCLUSION

The results of the study show that the smoking stop model is effective for improving smoking rehabilitative behavior of junior high school students.

**Ethical Clearance:** This study has obtained ethical clearance from Ethics Committee of the Ministry of Health of the Republic of Indonesia, with Number: 93/KEPK/VIII/2018.

**Source of Funding:** This research was funded by the Health Polytechnic of Jakarta I, 2017 budget.

**Conflict of Interest:** Related to this study, it was stated by the researchers that there was no conflict of interest that could affect the objectivity of the results of the study.

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# Family Support and Activities of Elderly with Hypertension in the Working Area of Mangasa Public Health Center, Makassar City, Indonesia

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## ABSTRACT

Families have important support functions including social support (families function as seekers and information givers), emotional support (families function to assist in emotional mastery), concrete support or direct support including financial assistance, and support for child care, elderly care, shopping and carrying out household tasks. This form of support consists of informational support, instrumental support, appreciation support and emotional support. The study aimed to analyze the relationship between family support and the activities of elderly with hypertension in the work area of Mangasa Public Health Center, Makassar City, Indonesia, using a cross sectional design. The subjects of the study were 139 elderly with hypertension selected randomly. Data collected through filling out the questionnaire then analyzed by Fisher exact test. The results of the analysis indicate a correlation between information support, appreciation, and emotional support with the activities of elderly hypertension.

**Keywords:** *Elderly, Hypertension, Family support*

## INTRODUCTION

Increased Life Expectancy affects the elderly population. Life expectancy in 2007 is 70.5 years<sup>(1)</sup>. Life expectancy in 2011 is 74.5 years<sup>(2)</sup>. Increasing life expectancy has an impact on increasing the number of elderly people. Various impacts will arise due to an increase in the number of elderly people and this fact will have an impact on the health condition of the elderly, along with age. Elderly people will experience a decline in function as a result of changes that occur. Degenerative diseases often accompany the lives of the elderly<sup>(1)</sup>.

Along with age, the elderly will experience changes in their entire body system. Elderly people experience changes in the cardiovascular system that cause various physiological changes such as changes in blood vessel elasticity and increased blood pressure. The 2007 Basic

Health Research results showed that the prevalence of hypertension in Indonesia based on the results of blood pressure measurements at the age of 18 years and over was 31.7% with hypertension, and only 7.2% of the population had known that they were suffering from hypertension<sup>(3)</sup>.

Hypertension experienced by the elderly will affect the fulfillment of daily needs and other physical activities. The type of activity that is disrupted, generally is part of daily routines that reflect independence, physical function and involvement in social relations<sup>(4)</sup>. The characteristics of disorders in the elderly are the presence of disability and disease. Disease can cause disability, weakness and dependence<sup>(5)</sup>. The family is a place for the elderly to fulfill all their needs and most of the elderly live with their families, which is 85%<sup>(6)</sup>. Families can provide a familiar environment, affection and feeling needed for the elderly<sup>(7)</sup>. Not allowing the elderly to live in nursing homes is a form of appreciation for the elderly.

According to Caplan in Friedman, families have important support functions including social support (families function as seekers and information givers),

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emotional support (families function to assist in emotional mastery), concrete support or direct support including financial assistance, and support for child care, elderly care, shopping and carrying out household tasks. This form of support consists of informational support, instrumental support, appreciation support and emotional support<sup>(8)</sup>.

The study aimed to analyze the relationship between family support and the activities of the elderly with hypertension.

## MATERIALS AND METHOD

The design of this study was cross sectional, namely analyzing the relationship between family support (information support, financial support, award support, and emotional support) with the activities of the elderly with hypertension. The study was conducted in the work area of the Mangasa Public Health Center, Makassar City, Indonesia, on July 25 to October 29, 2016. The population in this study were all families who had elderly family members with hypertension. The sample size is 139 people selected by random sampling technique. Data was collected through filling out questionnaire questionnaires about family support that had been developed by researchers, using the IADL measurement format (Daily Living Instrumental Activity) according to Lorenz. The collected data is categorical so that it is presented as a frequency and percentage<sup>(9)</sup>, then analyzed using Fisher's exact test.

## FINDINGS

Most of the elderly aged 60-74 years (82.8%), women (61.9%), high school education (38.8%). The level of dependence of elderly people with hypertension, most were in the independent category (75.5%). Meanwhile, most of the information support was in the adequate category (92.8%), instrumental support in the adequate category (82.7%), award support in the adequate category (97.1%), and emotional support were also in the adequate category (89.2%). It was concluded that the proportion of adequate support was greater when compared to inadequate support.

The Fisher's exact test show the following results:

1. Information support was related to the activities of the elderly with hypertension (p-value <0.05, with OR = 2.764 (CI: 1.513-5.052))
2. Instrumental support was not related to the activities of the elderly with hypertension (p-value > 0.05)
3. Award support was related to the activity of the elderly with hypertension (p-value <0.05, with OR = 3.266 (CI: 1.714-6.223))
4. Emotional support was related to the activity of the elderly with hypertension (p-value <0.05, with OR = 3.444 (CI: 2.074-5.719)).

## DISCUSSION

Activities of the elderly with hypertension are generally in the independent category. This is in line with the results of the research in the category of the highest age, namely the youngest elderly. Aging accompanied by physical or psychological disorders will affect the level of dependence of the elderly. The older people are accompanied by problems, the higher their dependence on other people or families.

Family support in this study was divided into two categories, namely adequate and inadequate. In this case, the highest proportion is in the adequate category. Both information support, instrumental support, appreciation support, and emotional support are all in the adequate category. Family support is an important social support for family members, especially for the elderly who have problems or those who experience illness. Social support is a process of relationships between families and their environment. Family social support is interactional and reciprocal<sup>(10)</sup>.

Furthermore, it was stated that people who are in a supportive social environment generally have better conditions than people who do not have support. Only a few families prepare to fulfill the physical, financial and emotional needs of the elderly. Based on the results of the analysis it can be stated that family social support consisting of information support, instrumental support, appreciation support and emotional support is needed by the elderly with hypertension. The existence of a strong intergenerational relationship is expected that the family will provide maximum support to the elderly. Social support can be given maximally if the family has knowledge about the elderly and problems that may be faced by the elderly, especially about hypertension experienced by the elderly.

The results of this study state that, there is a relationship between information support with the activities of the elderly with hypertension. Families with inadequate information support are more likely to have problems with the activities of the elderly with hypertension in their families. Information support is part of family social support. Information support is used in interacting and is coping used by the family in dealing with problems faced by the family. Information support is defined as information exchange at the interpersonal level<sup>(10)</sup>.

Families need to get information about how to communicate or how to deliver effective and efficient information to the elderly, so that the occurrence of misperceptions can be avoided. Submission of information to families about hypertension, including ways to prevent and treat it will be useful to prevent or reduce the level of dependence of the elderly, or it is expected that the elderly with hypertension can be independent in meeting their needs and will affect the psychological condition of the elderly so they can live better lives. In addition, facilities and infrastructure in the house can support the elderly to obtain information that is useful for maintaining health.

The results of this study state that, there is no relationship between instrumental support and the activities of the elderly with hypertension. Instrumental support is closely related to the activity of elderly people with hypertension as measured by using the IADL measuring scale. The IADL scale specifically measures the level of ability of the elderly in fulfilling their daily needs. Family instrumental support also measures the level of family support in meeting the daily needs of the elderly. It can be concluded that older people with more independent activities will be able to meet their own needs so that they will need a minimum of instrumental support from the family. Although the results of the study state that there is no relationship between instrumental support and the activities of the elderly with hypertension, but instrumental support from the family is still needed by the elderly hypertension. Elderly people with hypertension still need family financial support in dealing with hypertension that they experience such as the need to arrange a menu that is suitable for hypertension, the need for treatment and treatment of hypertension experienced by the elderly.

The results of this study state that there is a relationship between award support and the activities of

the elderly with hypertension. Families with inadequate appreciation support are more likely to have problems with the activities of the elderly with hypertension, compared to adequate support. Award support is part of family social support. Families are expected to involve the elderly in making decisions about the lives of the elderly later<sup>(10)</sup>. Furthermore it was stated that, support for family members such as involving family members in solving problems in the family or conducting deliberations is a form of appreciation to family members.

Based on the results of the analysis it can be stated that the form of award support for the elderly will improve the health status of the elderly. With adequate appreciation support, the level of health of the elderly with hypertension will be better, so that activities will be more independent in meeting their needs.

The results of this study state that, there is a relationship between emotional support and the activities of the elderly with hypertension. Families with inadequate emotional support are more likely that the elderly in their families experience dependence in activities, compared with families with adequate emotional support. Emotional support is part of family social support. Emotional support is expected to provide a supportive effect, providing comfort to family members<sup>(11)</sup>. Conveying warmth, listening to worries and complaints of family members is the practice of giving emotional support<sup>(10)</sup>. Family emotional support for family members, including the elderly with hypertension, is expected to improve the psychological condition of the elderly, so that the elderly feel still valued and useful for other family members and the elderly do not feel lonely in the family<sup>(12)</sup>.

Based on the results of the analysis it can be stated that the higher the family's emotional support for the elderly, the lower the level of loneliness experienced by the elderly. By reducing the level of loneliness experienced by the elderly, it means that the family has tried to prevent the occurrence of depression in the elderly. Preventing loneliness and depression in the elderly is a form of emotional support given by the family. In addition to support from the family, emotional support can be provided by giving the opportunity for the elderly to socialize or interact with the environment, so that they can increase the dignity of the elderly such as participating in the elderly group, Self Help Group, and integrated elderly service post.

The activity will be a forum for the elderly to increase self-esteem and can increase the knowledge of the elderly, so that the elderly avoid feeling lonely. With increasing self-esteem in the elderly with hypertension, it is expected that there will be an increase in the spirit of life of the elderly, so that the will and ability to do activities will be even greater, so that they will be more independent and less dependent on their families.

## CONCLUSION

In the work area of the Mangasa Public Health Center, Makassar City, Indonesia, the independence of the elderly with hypertension in activities is related to information support, appreciation support, and emotional support provided by their families.

Based on the results of the study it was suggested that the development of health care programs for the elderly be supported by the formation of support groups for elderly health problems, especially those suffering from hypertension. It is also necessary to provide extensive information to the public about the problems of the elderly in the family, using more complex methods. Methods that can be used include the distribution of leaflets, the use of posters, the dissemination of information with audiovisual media.

**Ethical Clearance:** This research had fulfilled the ethical clearance procedure.

**Conflict of Interest:** In addition, there was no conflict of interest relating to this research.

**Source of Funding:** The funding of this research taken from the authors.

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# SITRUST App: Detecting TB Cases and Increasing RMT Utilization in the Healthcare Facilities in East Java

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## ABSTRACT

Rapid Molecular Test (RMT) is a revolutionary test for detecting TB cases in developing countries. However, RMT has not been utilized optimally in developing countries. For example, in East Java, 80% of healthcare is expected to utilize RMT in order to diagnose TB cases, yet only 28% of healthcare facilities utilize it. Most healthcare facilities prefer to use microscopic approach to diagnose TB cases in their areas. Some challenges remain, such as complex referring system, time consuming, and use paper based recording system. In regards to address these challenges, SITURST Application was developed to also improve the accuracy as well as the effectiveness of detecting TB cases. SITRUST App is a system that support healthcare facilities in delivering TB specimen to have tested in other healthcare facilities that have Xpert Test. The Ministry of Health has been piloted SITURST App in 10 provinces in Indonesia, including five districts in East Java. A qualitative approach was implemented in order to understand the key factors that influence RMT utilization after SITRUST App was being introduced to several healthcare facilities in East Java, Indonesia. The results show that SITRUST App has several advantages compare with the previous test, such as easy and rapid which encourage healthcare facilities to utilize RMT.

**Keywords:** *SITRUST App, RMT utilization, Sample reference test*

## INTRODUCTION

In 2016, it was estimated that there were 1,020,000 TB cases in Indonesia, yet only 35 percent of the predicted were notified<sup>(1),(2)</sup>. The cases is probably underreported or under-diagnosed. The Government of Indonesia (GoI) introduced a new test to detect TB cases which is called RMT. Initially, in 2012, RMT was introduced to only diagnose TB drug resistance<sup>(3)</sup>. Since 2016, RMT became the main test to diagnose TB cases in all suspected TB patients<sup>(3)</sup>.

Compared to other provinces in Indonesia, East Java has the most RMT test with approximately 84 RMT in healthcare facilities which has been distributed in 38

districts. However, only 28 percent of the total RMT in healthcare facilities was utilized<sup>(3)</sup>. This percentage is still far away from the target (80 percent of RMT utilization in the healthcare facilities). RMT has not been utilized optimally in East Java Province<sup>(4)</sup>. With this in mind, East Java Provincial Health Office and KNCV Foundation, Indonesia developed a joint collaboration which aims to strengthen the existing referral system by involving digital technology or SITRUST App<sup>(5)</sup>.

The concept of SITRUST app is basically similar to online transportation system which has been use widely in Indonesia and other countries. It is functioning as an external courier which accountable to deliver TB sputum to be tested in the healthcare facilities that have RMT, In December 10<sup>th</sup>, 2017<sup>(5)</sup>. The local government, in this case the East Java Provincial Health Office together with PT. POS Indonesia signed an agreement in order to strengthen referral system of diagnosing TB incident. Using the existing courier, such as PT. POS Indonesia, it is expected to have reach out wider communities including healthcare facilities remote areas in East Java Province.

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As a new technique (SITRUST App) that has never been implemented in Indonesia which aims to improve TB referral system in Indonesia, it is important to understand the contribution of this app in increasing the utilization of RMT in East Java Province. Thus, SITRUST App was piloted in five districts in East Java, namely Surabaya, Gresik, Sidoarjo, Malang and Jombang, and started since September 1<sup>st</sup>, 2017. These areas were selected due to high number of TB cases and near with Referral Hospital of TB Drug Resistant (dr. Soetomo Hospital of Surabaya, Haji Hospital of Surabaya, dr. Saiful Anwar Hospital of Malang, General Hospital of Sidoarjo, Ibnu Sina Hospital of Gresik and General Hospital of Jombang).

**Table 1: Number of TB Cases & TB Drug Resistant Cases in five districts in 2016**

No.	Name of Districts	TB Cases	TB Drug Resistant Cases
1.	Surabaya	5428	66
2.	Sidoarjo	2877	17
3.	Gresik	1815	23
4.	Jombang	1325	12
5.	Malang	1860	7

## MATERIALS AND METHOD

RMT and Xpert MTB/RIF test is a new methodology to detect TB cases using molecular with the basis of nested real-time PCR. PCR Primer is able to amplify 81 bp of the core of gen rpoB MTB complex, while probe is designed to differentiate between wild type sequent and mutation on the core area that relates to rifampicin resistance<sup>(6),(7),(8)</sup>.

This test is using GeneXpert which automatically integrates specimen purification, amplification of nucleate

acid, and detection of the targeted sequent. The system consists of GeneXpert, computer and software device. Each test uses non-reusable cartridge which is designed to minimize cross contamination. Xpert MTB/RIF cartridge has two samples, namely Sample Processing Control (SPC) and Probe Check Control (PCC). SPC is used as an adequate process control of the targeted bacteria in order to monitor the PCR reaction inhibitors. PCC is used to ensure the reagent rehydrate continuously, PCR tube charging to cartridge, probe integrity, and dye stabilization are working well. The Xpert MTB/RIF test is able to detect MTB complex and drug rifampicin resistance in the same time by using amplification of the gen rpoB sequent specific. MTB complex uses five probe molecular beacons (Probe A-E) to identify gen mutation in gen rpoB area. every molecular beacon is labelled by different dye florofor. Cycle threshold (Ct) is able to analyse the results of probe A, B and C in total of 39 cycles, while probe D and E are 36 cycles. The results can be interpreted in different ways.

Xpert MTB/RIF test is organised automatically based on standard procedure operational (SOP) and cannot be modified. It needs two good quality samples of specimen-S-S or S-P. This is because of several reasons as below:

- one specimen to be tested by RMT
- one specimen to be stored temporarily and it will be tested if the first specimen: 1) invalid, 2) RIF indeterminate, 3) RIF resistance on suspect TB that is not categorized as TB drug resistance, 4) RIF Resistance, specimen refer to Line Probe Assay (LPA) for test of Lini-2 with rapid test.

Specimen non-sputum to be tested by RMT should consist of Cerebro Spinal Fluid (CSF), biopsy tissues, gastric lavage, and gastric aspirate.

**Table 2: Results and interpretation of RMT test**

Results	Interpretation	Follow-up
MTB DETECTED; Rif Resistance DETECTED	DNA MTB is detected Mutation Gen rpoB is detected, potentially Rif Resistance	Follow the process based on TB resistance flow chart
MTB DETECTED; Rif Resistance NOT DETECTED	DNA MTB is detected Mutation gen rpoB is not detected. High sensitivity to Rif	Follow the process based on regular TB diagnose flow chart
MTB DETECTED; Rif Resistance INDETERMINATED	DNA MTB is detected Mutation gen rpoB/Rif resistance cannot be detected because the first signal is not enough to be detected.	Repeat test*) as soon as possible using the new sputum with better quality

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MTB Not Detected	DNA MTB cannot be detected	Continue to TB diagnose flowchart
INVALID	DNA MTB cannot be determined because the SPC curve shows some increases in amplicon; this sample process is not right, PCR reaction is late.	Repeat test with new sputum and cartridge*); ensure no materials that could obstruct PCR (see annex 11)
ERROR	DNA MTB cannot be determined, quality control internal failed or the system is failed	Repeat test with the new cartridge*), ensure the specimen management correctly (see chapter VI.B. Problem Solving)
NO RESULT	DNA MTB cannot be determined because PCR data reaction is not enough	Repeat test with new cartridge*) (see chapter VI.B. Problem Solving)

\*) if Intermediate/Invalid/Error/No Result is appeared in the monitor, the test can only be repeated once.

**Table 3: RMT Location in Five Districts with SITRUST Implementation**

No.	Districts/ Municipalities	Healthcare Facilities	Number of Equipment	Total Module
1.	Surabaya	dr. Soetomo Hospital of Surabaya	1	16
		BBLK Surabaya	2	6
		Haji Hospital of Surabaya	1	4
		RSP Surabaya	1	4
2.	Sidoarjo	General Hospital of Sidoarjo	1	4
		Krian Health Center	1	4
3.	Jombang	General Hospital of Jombang	2	8
4.	Gresik	Ibnu Sina Hospital of Gresik	2	8
		Semen Gresik Hospital	1	4
		Alon-alon Health Center	1	4
		Driyorejo health center	1	4
		Balongpanggung Health Center	1	1
		Mentaras Health Center	1	4
		Cerme Health Center	1	4
		Sidayu Health Center	1	4 (out of order; waiting for maintenance)
5.	Malang	Kanjuruhan Hospital	1	4
		Wawa Husada Hospital	1	4
		Lawang Hospital	1	4
		Turen Health Center	1	4
		Donomulyo Health Center	1	4
		Singosari Health Center	1	4
		Ampel Gading Health Center	1	4

Online shopping has become a new trend in this digital era. Many people prefer to shop online due to its efficiency. People can search any appropriate applications and download it based on their preference. Online shopping is identically with freight forwarding

services because it supports their business, particularly delivering their products. Smart phone supports online business significantly, because with one click away, people are able to monitor their package as well as checking cost of delivery.

As above, SITRUST App uses the same principle as this online shopping. SITRUST is an information system that to monitor specimen delivery from healthcare facilities which no RMT tool to healthcare with RMT. SITRUST app has five menu such as (i) delivery order, (ii) delivery status, (iii) recipient healthcare facilities, (iv) courier information and (v) user setting. As an example, if health professional wants to monitor the delivery, she/he should press the delivery status, then, the courier will receive a notification of package delivery. A confirmation that the specimen has been accepted will be provided by the recipient, and the recipient will also provide the result of the diagnose.

SITRUST App needs an internet connection. This app can be accessed by many people based on their tasks and responsibilities. SITRUST App consists of two platforms, namely Web Base App that is used as data analysis and recording SITRUST users and Mobile Based App using Android that is used to deliver and

receive specimen. Compare to the conventional test, SITRUST can assist healthcare facilities to record and refer TB specimen safely, therefore, it is important to encourage healthcare facilities to utilize this App.

A descriptive analysis approach was used to understand RMT Utilization before and after use SITRUST app. The data was collected in five districts such as Sidoarjo, Malang, Jombang, Gresik and Surabaya from September 2017 to September 2018. The resource was gathered from SITRUST dashboard which facilitated by the Ministry of Health, KNCV Foundation, Indonesia together with the local government, in this case District Health Office in East Java provided the relevant data of their regular report from healthcare facilities in five piloting districts. The report is related to RMT utilization in these five areas. The data, then analyse using descriptive method, as this method is able to provide clear information about TB referring system that utilize SITRUST and RMT.

	NO	NO ORDER	TGL ORDER	FASKES PENGIRIM	TGL PICKUP	FASKES PENERIMA	TGL TERIMA	STATUS	DURASI	
 	3021	P3517010101-0518-05	17-05-2018 09:37	Pusk.Bandar Kedungmulyo	17-05-2018 11:32	RSUDJombang	22-05-2018 10:19	Terima	4 Hari, 22 Jam, 47 Menit	●
 	3022	P3507210101-0518-10	17-05-2018 09:36	Puskesmas Wagir		RSU WAVA HUSADA	22-05-2018 10:49	Terima		●
 	3023	P3507040202-0518-09	17-05-2018 08:58	PKM Wonokerto		PKM Turen	17-05-2018 10:56	Terima		●
 	3024	P3507080201-0518-07	17-05-2018 08:56	PKM Tirtoyudo		PKM Ampelgading	22-05-2018 09:54	Terima		●
 	3025	P3517090101-0518-20	16-05-2018 14:44	Pusk.Mojoagung	16-05-2018 15:22	RSUDJombang	22-05-2018 10:31	Terima	5 Hari, 19 Jam, 8 Menit	●
 	3026	P3517090101-0518-19	16-05-2018 14:42	Pusk.Mojoagung	16-05-2018 15:22	RSUDJombang	22-05-2018 10:31	Terima	5 Hari, 19 Jam, 8 Menit	●
 	3027	P3517090101-0518-18	16-05-2018 14:41	Pusk.Mojoagung	16-05-2018 15:22	RSUDJombang	22-05-2018 10:22	Terima	5 Hari, 19 Jam	●

**Source:** Sitrust Dashbord - The Ministry of Health and KNCV Foundation, Indonesia

(**Note:** The contents are in Indonesia version)

**Figure 1: Dashbord of SITRUST**

## FINDINGS

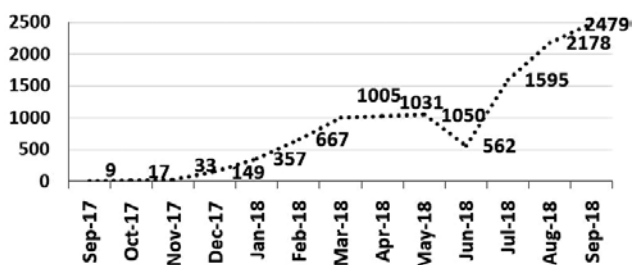
Since SITRUST was introduced, the referral system of TB specimen is recorded automatically to the server. Prior to SITRUST app, referral of TB specimen was

recorded manually (paper based system). As a result of an AutoSaved system, the data are easy to access and recall by the users. Using this new technology, there are some significant advantages, such as (i) easy to identify TB incident; (ii) easy to count the total of TB suspect that



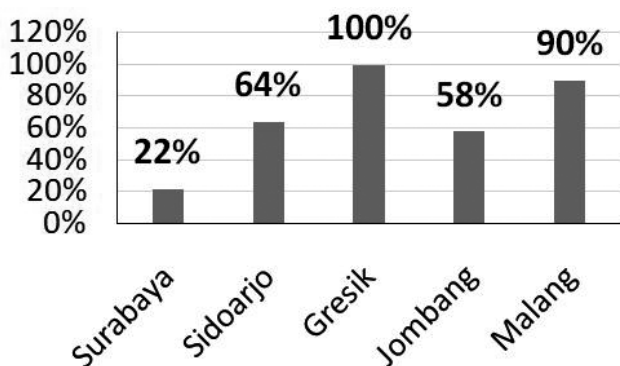
refers to healthcare facilities; (iii) easy to measure the contribution of SITRUST utilization to the increasing number of RMT utilization.

After a year of SITRUST App was implemented (from September 2017 to September 2018) in five districts in East Java. The trend of utilization RMT has increased significantly from nine referral sputum samples in September 2017 to 2518 by September 2018. Figure 2 shows that SITRUST App has helped health facilities to have a better way to measure the number of TB cases in the community. This number can be a basis to develop some solutions to prevent and reduce TB cases.

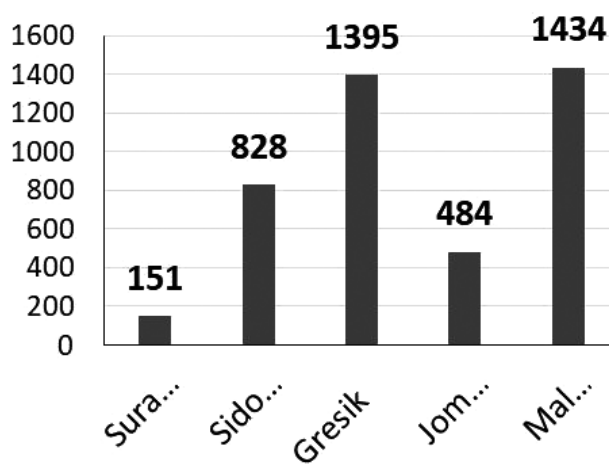


**Figure 2: Number of sample referral to healthcare facilities with RMT in East Java Province, September 2017–September 2018**

Additionally, the increased of SITRUST utilization has also impacted on the increased number of specimen referral and utilization of RMT as tools to rapid diagnostic of TB cases. The results of TB test are recorded in the SITRUST system automatically, thus it can be forwarded to the related healthcare facilities within a minute. This system has significant impacted on the risk of loss to follow-up as the paper based system is more likely to experience it. In June 2018 a lot of holiday so that SITRUST utilization became decrease.



**Figure 3: Percentage of healthcare facilities participation in five districts in East Java Province, September 2017–September 2018**



**Figure 4: Sample Referral to Healthcare Facilities with RMT in Five Districts in East Java Province, September 2017–September 2018**

Figure 3 and 4 indicates that the highest number of the specimen referral was located in Gresik district. Gresik district and Malang Municipality were the two healthcare facilities utilize SITRUST App reached 100 percent. While other healthcare facilities in referring TB specimen to RMT laboratory was varied between districts/municipalities from 22 percent to 100 percent. Because Gresik has 8 RMT and Malang has 7 RMT so can built network with many healthcare for sample referral to RMT.

Since the pre-implementation of SITRUST was introduced in five districts/municipalities in East Java shows, a significant increased on RMT utilization was shown in Figure 2 healthcare facilities where reached its peak on RMT utilization was General Hospital of Sidoarjo, it was 100 percent in January 2018. Krian Health Center reached 96 percent of the RMT utilization and General Hospital of Jombang reached 95 percent of the utilization of RMT. These three healthcare facilities have maintained their percentage above 80 percent on Xpert-Test utilization. Because District Health Office has developed networking of sample referral to RMT and every suspect TB diagnosed by RMT.

**CONCLUSION**

SITRUST App is able to: 1) Strengthen notification system within healthcare facilities network from a healthcare facility that has no RMT to the one that has RMT, 2) Contribute to RMT utilization, 3) Uplift the burden of delivering TB specimen by health workers, 4) Increase the access on TB diagnostic which notified

by using electronic device, 5) Encourage delivery of TB specimen to be tested in healthcare facilities that has RMT, 6) Support the risk of loss to follow-up. Furthermore, it is recommended to increase its use in the field by improving the elements in SITRUST in the order of priority, for example using DUP (Difficulty-Usefulness Pyramid)<sup>(9)</sup>.

**Conflict of Interest:** No

**Ethical Clearance:** Yes

**Source of Funding:** Authors

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# Adherence to the National Immunization Schedule for the First Year of Life in Misan, Iraq

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## Abstract

**Background:** Compliance with age-appropriate receipt of immunization is critical for providing maximum effectiveness against the vaccine-preventable diseases. The Advisory Committee on Immunization Practices recommends specific ages and intervals for vaccines to be administered to maximize their effectiveness. Till now in Misan (South East of Iraq); a considerable proportion of morbidity and mortality was detected in children under the age of 5 years due to vaccine-preventable diseases.

### Objectives:

- To determine the rate of adherence to the immunization schedule in the first year of life in order to generate a baseline data that can be used to improve the vaccination uptake in Misan, thus, saving more lives.
- To determine the causes and risk factors influencing the pattern of immunization adherence.

**Patients and Method:** A cross-sectional study was conducted in Misan Hospital for Child and Maternity. By a random selection, the study enrolled 250 mothers having infants aged 1-2 years attending the hospital as out-patient visitors. Through an interview with the mother, the required data were collected.

**Results:** Among 250 infants; 22.8% with complete adherence to the national immunization schedule during the first year of life, 68% with partial adherence, and 9.2 % with no adherence. Statistically, immunization adherence was significantly associated with mother's education, residence, and place of delivery.

**Conclusion:** Adherence to the national immunization schedule in the first year of the life in Misan province was low and not the promising rate. Efforts toward the primary health care centers to raise the awareness and education about immunizations are still required to further reduce the vaccine-preventable morbidity and mortality in children.

**Keywords:** immunization, vaccine, adherence, infant, Misan.

## INTRODUCTION

Childhood immunization is one of the most important public health strategies in the control and prevention of infectious diseases<sup>(1,2)</sup>. In spite of these facts, some parents may delay vaccinating their children or may follow an alternative immunization schedule or may even reject the administration of some vaccines because of some beliefs or medical, religious, or socioeconomic causes<sup>(2,3,4)</sup>.

However, this attitude will make their children at more risk to have communicable diseases and will increase the chance of having outbreak via the loss of the herd immunity with the reemergence of the vaccine-preventable diseases<sup>(5,6)</sup>.

Furthermore, the World Health Organization has reported that about ten millions of children under the age of five years are still dying every year in the world and more specifically in developing countries. The communicable diseases are still representing 7 out of 10 major causes of death in children, and reach about 60% of all child deaths<sup>(7,8,9)</sup>.

Annually, the Advisory Committee on Immunization Practices recommends specific ages and intervals for vaccines to be administered to maximize

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their effectiveness. Therefore, compliance with age-appropriate receipt of immunization is critical for providing maximum effectiveness against the vaccine-preventable diseases <sup>(10)</sup>.

Iraq is one of the Middle East countries of over 30 million populations who have faced a lot of challenges till now. Misan province is located in the South East region of Iraq with about 1.1 million individuals according to the annual report at 2017 <sup>(11)</sup>.

In spite of the limited data, it was reported that the major causes of death in Iraq at 2009 were respiratory tract infection followed by diarrhea forming 34.0% and 24.4% respectively from the total mortality rate in children under the age of 5 years <sup>(12)</sup>.

It is of note that in Iraq, 2011; the rate of immunization uptake in infants (less than 1 year) was 78% only <sup>(13)</sup>. Currently, in Misan at 2017, the total hospitalization due to gastroenteritis in children younger than 5 years was approximately 21.5% from the total inpatient admission whereas the total mortality rate in children under the age of 5 years was 17/1000 live birth <sup>(11)</sup>.

For these reasons, this study had arisen to estimate the rate of immunization adherence in infancy in order to establish an approach to improve the vaccine compliance in Misan, hence, more vaccination uptake, less risk of vaccine-preventable diseases, and saving more lives.

## PATIENTS AND METHOD

A cross-sectional study was conducted in Misan Hospital for Child and Maternity during a period of 3 months from September 2018 to December 2018.

By a random selection, the study enrolled 250 mothers having infants aged 1-2 years attending the hospital as out-patient visitors. Through an interview with the mother, the required data were collected; infant's age, gender, place of delivery, residence, education level of the mother, and the causes beyond the partial or non-adherence to the immunization schedule.

Depending on the immunization card or based on mother recollection if no immunization card was available, the infants were classified into 3 groups according to the adherence pattern;

1. Infants who received all immunization doses of the first year of life according to the national

immunization schedule timing were called infants with complete adherence,

2. Infants who received all vaccines of the first year during the first year of life but did not restrict to the schedule timing and vaccines administration were frequently delayed were called infants with partial adherence,
3. And finally, infants with non-adherence who were unable to receive all the due vaccines for the first year of life before the first birthday.

The new National Iraqi Immunization program was applied in our country from November 2015 up to date <sup>(14)</sup>. These vaccines are free of charge and usually provided in the Primary Health Care Centers only.

The study protocol was approved by ethical committee of the Ministry of Higher Education, College of Medicine in Misan, Misan directorate of health and Misan Hospital for Child and Maternity to carry out this study. The data analysis was done by SPSS software version 21.0, and then it was formulated as tables and figures. Also, the Chi-square test was applied to determine the association between the different variables. Statistical significance was detected whenever *p*-value is equal or less than 0.05.

## RESULTS

Among 250 infants; the majority (68%) had a partial pattern of immunization adherence whereas infants with complete adherence were forming 22.8% as shown in **figure 1**.

Regarding the causes that affect the immunization adherence; it was found that more than half (52.8%) of infants had an acute illness during the time of vaccine and more than a quarter were of a busy family.

Other causes were being lived away from the primary health care center, had a chronic illness, and parental belief forming 12.4%, 4.1%, and 3.2% respectively as shown in **table 1**.

Statistically, there was a significant association between the pattern of immunization adherence and residence, place of delivery, and mother's education in which *p*-values were 0.008, 0.013, and 0.04 respectively as shown in **table 2**.

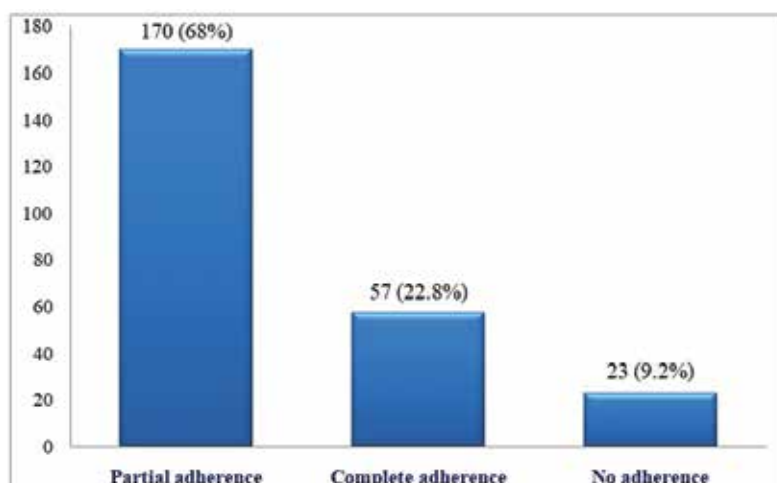


Figure 1: Patterns of immunization adherence in the first year of life

Table 1: Causes of non-adherence to the immunization schedule for the first year of life

Causes	Number (%)
Ill infant during the time of vaccine	102 (52.8%)
Busy family	53 (27.5%)
Living away from the primary health care center	24 (12.4%)
Infant with chronic illness	8 (4.1%)
Parental belief	6 (3.2%)
Total	193 (100%)

Table 2: Relationship between the immunization adherence and risk factors

Risk factors	Immunization adherence			Total No. (%)	P. value
	Complete adherence	Partial adherence	No adherence		
<b>Gender:</b>					
Male	36 (26.7%)	88 (65.2%)	11 (8.1%)	135 (100%)	0.26
Female	21 (18.3%)	82 (71.3%)	12 (10.4%)	115 (100%)	
<b>Residence:</b>					
Urban	20 (18.0%)	86 (77.5%)	5 (4.5%)	111 (100%)	0.008
Rural	37 (26.6%)	84 (60.4%)	18 (13.0%)	139 (100%)	
<b>Place of delivery:</b>					
Hospital	48 (22.0%)	154 (70.6%)	16 (7.4%)	218 (100%)	0.013
Home	9 (28.1%)	16 (50.0%)	7 (21.9%)	32 (100%)	
<b>Education level:</b>					
Illiterate	22 (20.4%)	72 (66.6%)	14 (13.0%)	108 (100%)	0.04
Primary	18 (20.9%)	65 (75.6%)	3 (3.5%)	86 (100%)	
Secondary	10 (25.0%)	24 (60.0%)	6 (15.0%)	40 (100%)	
College	7 (43.7%)	9 (56.3%)	0 (0.0%)	16 (100%)	

**DISCUSSION**

Immunization is considered one of the most cost-effective public health efforts in reducing mortality

in children under the age of 5 years <sup>(9)</sup>. The measles vaccination alone prevented 15.6 million deaths in children between 2000 and 2015 globally <sup>(15)</sup> indicating that the compliance to the recommended immunization

program is a challenge for the health care system to achieve Millennium Development Goal 4<sup>(7,9,15)</sup>.

The current study revealed that the rate of infants with complete adherence to the national immunization program was low and not reaching even one-quarter from the total (22.8% only). In comparison with United States (US) in 2016; it is lower than US rates (26%)<sup>(16)</sup>.

On the other hand, vaccines administration were frequently delayed in infants with partial adherence to the national immunization program and those were forming the vast majority of the cases reaching 68% whereas the rate of no-adherence was not low forming about 9.2%. Approximately, the same was seen in US in whom the vast majority (74%) was frequently not restricted to the schedule timing<sup>(16)</sup>.

Consequently, the delayed vaccination would abate the effectiveness of immunization<sup>(10)</sup>, affect the development of herd immunity, and lead to disease transmission<sup>(5)</sup>.

The present study showed that most common cause of non-adherence to the national immunization program was ill infant during the time of vaccine, thus, parents would decide to postpone the due vaccine according to their poor knowledge and these findings were consistent with Turkey (Istanbul)<sup>(17)</sup>. So failure to administer vaccines for infants with minor illness will impede the vaccination effectiveness<sup>(10)</sup>.

Lack of parental education was the second main barrier to the immunization as concluded by Bahari et al in Mosul (North Iraq)<sup>(18)</sup> and this was consistent with the results of the current study in which there was a significant relationship between the education and the adherence to the immunization program.

Moreover, the rate of being fully vaccinated infants is approximately nine times more in educated mothers than non- educated mothers as concluded by Torun et al study in Istanbul<sup>(17)</sup>.

The second cause affecting the parental adherence to the immunization was the busy family (27.5%) and this agreed with Sporton et al study<sup>(19)</sup>. This can be attributed to the importance of parental education about the importance and effectiveness of vaccines against communicable diseases.

Living away from the primary health care center was the third cause affecting the immunization adherence as

agreed by 12.4% of the total sample. This obstacle was also seen at a higher rate (43.6%) in Istanbul in those with poor knowledge about vaccinations and living in the villages<sup>(17)</sup>.

In Turkey, Topuzoglu et al concluded that the ability to reach the primary healthcare center is one of the important factors that should be taken in consideration when planning the immunization program in the developing countries<sup>(20)</sup>.

In Misan, there was a misunderstanding by mothers that any infant with chronic illness should not receive any vaccine as seen in 4.1%. Additionally, to date, there was 3.2% not adhering to the national program because of their belief that there is no benefit from the vaccine and this was in accordance with Greek study in which there was less than 5% of parents omit or postpone immunization secondary to their beliefs<sup>(21)</sup>. Again this affected by the educational level of the parent and would need more communication efforts with the immunization provider to clarify the precaution and contraindication of the vaccines and highlight the important value of immunization adherence<sup>(22)</sup>.

Regarding the place of delivery; the current study showed that there was a significant association between immunization adherence and the place of delivery. There was more chance to have good compliance with infants who delivered in hospital and this can be explained by the policy of a routine initiation of immunization by giving hepatitis B vaccine to all delivered newborns in the Iraqi governmental hospitals. This significant association was compatible with Mosul study which reported that infants who delivered in the general hospitals were 12.9 times more possible to have complete immunizations than infants born at homes<sup>(23)</sup>. Also, it is agreed with Istanbul<sup>(17)</sup> which revealed that the delivered infant at home would be at a double risk to have delayed vaccination than the delivered infant in the hospital.

Moreover, Hospitalization could be used as an opportunity to provide the recommended immunizations and efforts should be considered to administer vaccines during admission or at discharge<sup>(24)</sup>.

In studying the different associated risk factors; the present study reported no significant association between the immunization adherence and gender which was incompatible with Istanbul and Ghana which showed that the gender would affect the immunization uptake<sup>(17,25)</sup>.

Misan is consisting of urban (74%) and rural groups (26%)<sup>(11)</sup>. The present study revealed a significant relationship between the residence and the pattern of immunization adherence in which there were more infants with complete adherence in rural than urban areas and this was compatible with Turkey<sup>(20)</sup>.

Lately, the incidence and the associated risks of communicable diseases have been significantly declined in the Western countries due to the immunization strategies that focused on infants and children<sup>(2)</sup>.

Different studies emphasize the important role of education about immunization in achieving more parental compliance with immunization schedule, thus, increasing the immunization rate of their children as demonstrated by different studies in Iraq<sup>(18)</sup>, Istanbul<sup>(17)</sup>, Greece<sup>(21)</sup>, and Ghana<sup>(25)</sup>.

In addition, educational and reminders interventions have a recognizable role in achieving appropriate immunization adherence, as well as, increasing immunization rates as shown in different studies<sup>(18,26)</sup>.

Finally, the effective role of immunization in decreasing the morbidity and mortality in children and achieving Millennium Development Goal 4 cannot be launched without parental compliance and appropriate adherence to the immunization schedule<sup>(4, 7, 9, 15)</sup>.

## CONCLUSION

Adherence to the national immunization schedule in the first year of the life in Misan province was low and not the promising rate. Efforts toward the primary health care centers to raise the awareness and education about immunizations are still required to further reduce the vaccine-preventable morbidity and mortality in children.

**Conflict of Interest:** The authors have no conflict of interest with any organization

**Source of Funding:** Research is not funded.

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# Personal Factors that Affect Adherence of Fluid Restriction in Patient with Hemodialysis

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## ABSTRACT

**Background:** Adherence to fluid restriction are a common problem and a major challenge for dialysis patients. The purpose of this study was to predict various patient personal factors which included changes in physical conditions (duration of dialysis, severity), psychological factors (stress, motivation), social factors (family support, peer support) and perceptions of adherence that affect dialysis patient's adherence on fluid restriction.

**Method:** A descriptive analytic with cross sectional approach was this research's design. There were 135 respondents involved in this research. The inclusion criteria for patients with a minimum age of 18 years, receiving similar dialysis therapy for at least 3 months, in stable medical conditions, and not experiencing psychological problems. The variables include fluid restriction adherence and the patient's personal factors which are physical factors (knowledge, length of dialysis, severity); psychological factors (stress, motivation); social factors (family support, peer support); and perceptions related to adherence. Data were analyze using logistic regression analysis.

**Findings:** The results showed that the most influential variable on adherence to fluid restriction was the level of stress experienced by patients. Odds Ratio (OR) of stress variables was 11.4 which means that dialysis patients who experience stress will show adherence of fluid restriction 11.4 times lower than other dialysis patients after controlling for variables of age, education, knowledge, severity, motivation, family support, peer support and perception.

**Conclusion:** psychological changes (stress) are the main predictors of fluid restriction compliance after being controlled by other variables.

**Keywords:** dialysis, adherence, fluid restriction, stress

## INTRODUCTION

Hemodialysis is one of kidney replacement therapy for patients with end stage renal disease, because kidney function improves the decline <sup>(1)</sup>. Fluid restriction are recommended for hemodialysis patients due to the inability of the kidneys to remove excess body fluids <sup>(2)</sup> and the risk of increasing complications from excess fluid <sup>(3)</sup>. Low fluids adherence may lead to the increased discomfort and side effects (e.g., cramping,

emesis, syncope) during and immediately after dialysis sessions <sup>(4)</sup>, cardiovascular problem (e.g., left ventricular hypertrophy, congestive heart failure, hypertension) <sup>(5)</sup>, fluid overload symptoms (lower-extremity oedema, ascites, shortness of breath, and pulmonary vascular congestion or acute pulmonary oedema) <sup>(5,6)</sup>, increased morbidity <sup>(6)</sup>, increased hospitalizations <sup>(4)</sup> and increased mortality in CKD patients <sup>(5)</sup>.

Problems with adherence to fluid restriction are a common problem and a major challenge for dialysis patients <sup>(7,8)</sup>. Adherence is the main key to success <sup>(9)</sup> and the patient's support in undergoing the treatment process through the knowledge and skills possessed <sup>(10,11)</sup>. Fluctuating changes of physical and psychosocial conditions in dialysis patients seem to contribute to

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the inability of dialysis patients to maintain adherence<sup>(12)</sup>. Specific factors related to changes in physical and psychological conditions (duration of dialysis, severity, stress, motivation) and perceptions of adherence and peer support need to be further analyzed to find out whether these factors also influence the adherence of dialysis patients in fluid restrictions.

Many previous studies have been carried out to determine the factors that influence adherence. Demographic characteristics that have been studied and are predictors of adherence include age<sup>(9,12-14)</sup>; gender<sup>(9,12,15)</sup>; level of education<sup>(9,12,16)</sup>; and marital status<sup>(9)</sup>. Other factors studied included patient knowledge related to disease and therapy<sup>(17,18)</sup>; social support<sup>(17,19,20)</sup>; duration of implementation on prolonged hemodialysis<sup>(15,21)</sup>; complexity and variety of drugs<sup>(22,23)</sup>; psychological condition (depression)<sup>(13,24-26)</sup>; limited awareness of health<sup>(27,28)</sup>; level of patient disability (which includes disability and difficulty in participation)<sup>(14)</sup>; difficult transportation<sup>(17)</sup>; dialysis measures (dialysis schedule, routine laboratory tests to be undertaken, complications during dialysis, problems related to hemodialysis machines)<sup>(17)</sup> and issues of individual trust in dialysis measures<sup>(17)</sup>. The purpose of this study was to predict various patient personal factors which included changes in physical conditions (duration of dialysis, severity), psychological factors (stress, motivation), social factors (family support, peer support) and perceptions of adherence that affect dialysis patient's adherence of fluid restriction.

## MATERIAL & METHOD

A descriptive analytic with cross sectional approach was this research's design. There were 135 respondents involved in this research. The inclusion criteria for patients with a minimum age of 18 years, receiving similar dialysis therapy for at least 3 months, in stable medical conditions, and not experiencing psychological problems. The "y" variable in this study is fluid restriction adherence, while the "x" variable includes demographic characteristics (age, sex, education); physical factors (knowledge, length of dialysis, severity); psychological factors (stress, motivation); social factors (family support, peer support); and perceptions related to adherence.

The instruments used in this study included a patient characteristic data sheet asking for age, sex, education, duration of dialysis and severity. Another instrument is

the knowledge questionnaire (consisting of 5 questions related to fluid restriction prepared by researchers using a reference to basic information on fluid restriction for patients with dialysis). The level of stress is obtained using the Perceived Stress Scale (PSS) instrument<sup>(29)</sup>. Assessment of patient motivation is obtained by modifying the Patient Motivation Inventory instrument<sup>(30)</sup>. The Multidimensional Scale of Perceived Social Support instrument<sup>(31)</sup> was used to assess family support and peer support. The patient's perceptions of adherence were modified from the Patient Perception Questionnaire instrument<sup>(30)</sup>. Assessment of adherence to fluid restriction was carried out using the Dialysis Diet and Fluid Non-Adherence Questionnaire (DDFQ) questionnaire<sup>(32)</sup>. Logistic regression analysis was used in the research and considered the value of Odd Ratio (OR).

## FINDINGS

There were 89.6% of respondents in the non-severe category showing adherence of fluid restrictions. There were 91% of respondents who showed adherence to fluid restrictions are in the category of very high stress levels. In table 1 could be seen that after going through the bivariate, multivariate and interaction analysis processes the results of the last statistical analysis showed that the most influential variable on adherence to fluid restriction is the level of stress experienced by patients. Odds Ratio (OR) of stress variables is 11.4 which means that dialysis patients who experience stress will show adherence of fluid restriction 11.4 times lower than other dialysis patients after controlling for variable of severity.

**Table 1: Factors associated with fluid adherence**

Variable	Fluid Adherence OR (95% CI)	p-value
Level of Stress	11.329 (1.113-115.344)	0.040
Severity	0.257 (0.089-0.744)	0.012

## DISCUSSION

In this research, stress levels were the main predictor in adherence to fluids restriction after controlling for variables of age, education, knowledge, severity, duration of dialysis, motivation, family support, peer support and perception. Very high stress levels increase the risk of non-adherence of dialysis patients. The results

of this study are in line with other studies that predict the relationship between adherence with psychosocial conditions which states that psychological conditions are predictors of phosphate binders adherence in addition to age and work<sup>(33)</sup>. In that study also stated that the variables of depression, anxiety, and stress were negatively related to adherence to treatment, which confirmed that negative emotional states could be a risk to adherence<sup>(33)</sup>.

Psychological distress and disorder represent a significant problem for ESRD patient<sup>(34)</sup>. Dialysis patients are susceptible to stress especially due to exposure to hemodialysis stressors and various rules that must be followed<sup>(35)</sup>. Another stressor was the problem of life, both related to the economy, personal relationships with partners, with children or other family members, social relationships, work, even education. Similar to other results which mentioned that the most psychological problems were food and fluid concerns, unemployment, sexual problems, changes in body appearance, limitation in physical activities, frequent hospitalizations, the length of time on dialysis, uncertainty about the future, changes in life style, increased dependence, and sleep disturbances<sup>(36)</sup>. Regarding the physiological stressors, the problems include fatigue, pain during venipuncture, muscle cramps, itching between treatments, nausea and vomiting<sup>(36)</sup>.

Psychosocial stressors are known to be associated with the use of coping mechanisms that are problem solving oriented<sup>(37)</sup>. This study confirms that psychosocial stressors (including those related to fluid restriction stressors) are more easily adapted to patients, of course, if the coping mechanism owned by patients focuses on solving problems<sup>(37)</sup>. Dialysis patients who experience repeated stressors will show skills in overcoming these stressors or as well as can cause exacerbations of symptoms of depression and impact on adherence<sup>(35)</sup>. Although stress is a major predictor that affects the adherence of dialysis patients in fluid restriction, dialysis nurses should consider severity of the disease.

Lack of motivation as known as one of the psychological barriers to restrict fluid<sup>(18)</sup>. In this research, motivation of respondents in this study is in the average category of being adherence of fluid restrictions. Respondents mention that fluid restriction is one of the recommendations that is felt to be quite difficult and burdensome to follow. Respondents who have been on dialysis for a longer time have a higher perception of the

benefits of controlling fluid overload<sup>(38)</sup>. Other research also reveal that there was a significant relationship between social support and adherence to dietary and fluid restrictions<sup>(19)</sup>.

The young age category is also a predictor of compliance with dialysis patients in fluid restrictions. The results of this study are different from studies that state that the younger age is a predictor of multidimensional repetitive or non-adherent (not only for fluid restrictions)<sup>(39)</sup>. Younger<sup>(15)</sup>, male patients and those with longer duration on hemodialysis found more likely to be non-adherent<sup>(15)</sup>. Respondents with a sufficient level of knowledge showed a comparison of the percentage of compliance and non-compliance with fluid restrictions was not much different. Lack of adequate knowledge of the major perceived barriers towards better adherence to fluid<sup>(15)</sup>. Others research states that no direct relationship was observed between dietary knowledge and any adherence measures<sup>(40)</sup>.

## CONCLUSION

Physical and psychosocial changes experienced by dialysis patients contribute to the achievement of fluid restriction compliance. This study shows that psychological changes, namely stress experienced by dialysis patients, are the main predictors of fluid restriction compliance after being controlled by other variables. Dialysis nurses need to consider the psychological changes experienced by patients and plan interventions that are appropriate to these conditions.

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# Shift Work and the Risk of Cancer—A Systematic Review

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## ABSTRACT

In 2007, the International Agency for Research on Cancer (IARC) classified shift work involving circadian disruption as “probably carcinogenic to humans”. A few epidemiological studies have sought to assess the association between shift work and the risk of cancer, although the results have been inconsistent. Thus, we aimed to conduct a systematic review of prospective cohort studies to summarize the epidemiological evidence of an association between shift work and the risk of cancer. The database used in this review was Medline/PubMed and search terms “shiftwork”, “shift work”, and “night work”. The limitations included text availability (free full text), language (English), search fields (title), and publication between January 2008 and January 2018. The search strategy resulted in twelve articles that met the selection criteria. Three studies presented results related to prostate cancer, two studies were related to lung cancer, four studies to breast cancer, and three studies related to other cancers. In conclusion, there is limited evidence of a causal association between night shift work and breast cancer, while there is insufficient evidence in respect to lung cancer, prostate cancer, and other cancers.

**Keywords:** *Shift work; night work; prospective cohort; cancer.*

## INTRODUCTION

Shift work and night work facilitate the round-the-clock activities required to meet technological needs (e.g. power plants, oil refineries, and the steel industry), social services/utilities functions (e.g. hospitals, transports, and the police), productive and economic demands (e.g., textiles, paper, food), and the needs of the leisure industry<sup>1</sup>. The effect is that companies require employees to work continuously, thereby creating a need for shift and night work schedules. Shift schedules allow companies to operate on a continuous basis by ensuring that their job positions are constantly filled by rotating employees. While shift frequency and duration may vary between companies, differences may also be observed in the number of consecutive work days and the direction of rotation. In Britain and Europe shifts will typically run from 6 am to 2 pm (early shift), 2 pm to 8 pm (late

shift) and 8 pm to 6 am (night shift), perhaps with the variation of an hour (or occasionally two hours) earlier in each case<sup>2</sup>.

Shift work has been linked to various acute and chronic diseases<sup>3</sup>. Chronic diseases such as cancer, can be triggered by circadian system disorders caused by exposure to light at night which changes the pattern of sleep activity, suppressing melatonin production, and leading to dysregulation of the genes involved in tumor development (Press Release N<sup>o</sup> 180 - International Agency for Research on Cancer 2007). Several case-control studies have identified that shift work or night work can be associated with an increased risk of prostate cancer<sup>4,5</sup>, despite other cohort studies revealing no such association<sup>6,7,8</sup>. Scernhammer et al.<sup>9</sup> found an elevated risk of breast cancer among women who had worked 20 or more years of rotating night shift work compared to women who reported never having worked rotating night shifts. Schwartzbaum et al.<sup>10</sup> meanwhile, found no increase in the risk of female breast cancer based on their definition of night work.

Over the past several decades, a number of epidemiological studies have assessed the association

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between shift work and the risk of cancer, yet the results have been inconsistent. Thus, we aimed to conduct a systematic review of prospective cohort studies with the aim of summarizing the epidemiological evidence of an association between shift work/night work and the risk of cancer.

## METHOD

**Literature search:** The database used in this systematic review was Medline/PubMed. The search for literature

in the database was conducted on July 12, 2018 using the keywords “shiftwork”, “shift work”, and “night work”, with the search criteria including text availability (free full text), language (English), search fields (title), and publication in peer-reviewed journals between January 2008 and January 2018. A prospective cohort study is the best observational design for questions of etiology and consequences<sup>11</sup>. For inclusion in this review, studies had to be prospective cohort studies with population based samples. Shift work/night work was the exposure variable, and the outcome was cancer.

## RESULTS

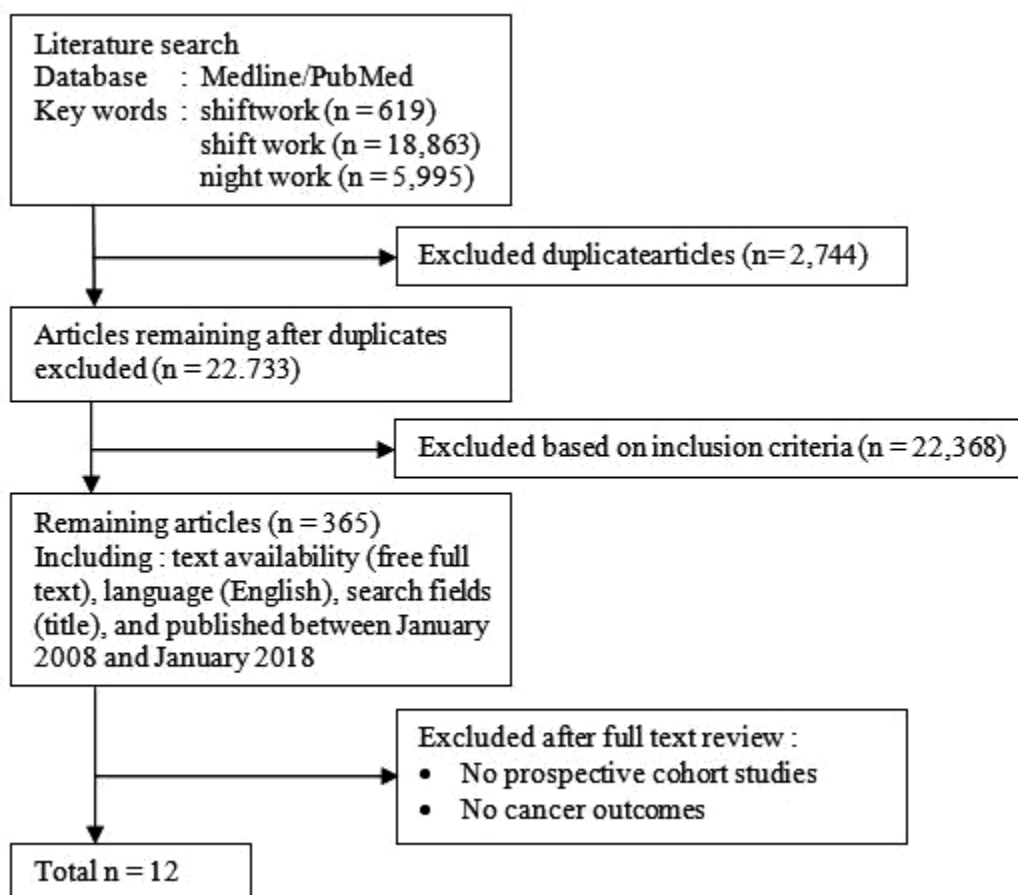


Figure 1: Flow diagram of the selection procedure

## DISCUSSION

In 2007, The International Agency for Research on Cancer (IARC - Press Release N<sup>o</sup> 180) stated that “shift work that involved circadian disruption was probably carcinogenic to humans”. The mechanism is a disruption of the circadian system caused by exposure to light at night. This has the ability to alter sleep-activity patterns, suppress melatonin production, and lead to dysregulation

of the genes involved in tumor development (International Agency for Research on Cancer 2007).

**Prostate cancer:** Based on the evidence obtained from three epidemiological studies, no significant association has been found between shift work and the risk of prostate cancer<sup>6, 7, 8</sup>. Hammer et al.<sup>8</sup> reported that shift workers did not have an elevated hazard ratio for prostate cancer in comparison to daytime workers (HR = 0.93, 95%



[CI] 0.73-1.18). In the overall analyses of Finnish twin studies, no significant association was identified between sleep duration, sleep quality, or shift work and prostate cancer risk, and no significant association between sleep and circadian-related parameters and prostate cancer specific mortality<sup>7</sup>. Similar results were found in Swedish twin studies, showing no association between the working of night shift and prostate cancer, nor between the duration of night work and prostate cancer. Likewise an analysis of twin pairs discordant for prostate cancer (n=332) showed no significant association between night work and prostate cancer<sup>6</sup>. These three studies contradict the results found by Kubo et al.<sup>12</sup> in their study, where it was reported that compared to day workers, shift workers were at a significantly greater risk of developing prostate cancer (RR = 3.0, 95% [CI] 1.2-7.7). However, there were several limitations to the research from Kubo et al.<sup>12</sup> one of which was the short follow-up time and relatively small cohort involved. The follow-up time was 10 years and there were only 31 cases of prostate cancer, meaning the results must be interpreted with caution. Overall for prostate cancer, a recent meta-analysis of nine prospective cohort studies found no clear association between night shift work and prostate cancer<sup>13</sup>.

**Lung cancer:** There is only a very limited amount of epidemiological research related to the association between shift work and lung cancer risk. Among the findings are a 28% increased risk of lung cancer among women (Nurses' Health Study) who have spent 15 or more years working rotating night shifts (RR = 1.28, 95% [CI] 1.07-1.53) compared to women who have not worked any night shifts<sup>14</sup>. This association was strongest in respect of small-cell lung carcinomas (RR = 1.56, 95% [CI] 0.99-2.47) and was not observed for adenocarcinomas of the lung (RR = 0.91, 95% [CI] 0.67-1.24). Further, the increased risk associated with 15 or more years of rotating night-shift work was limited to current smokers (HR = 1.61, 95% [CI] 1.21-2.13), with no such association seen in nonsmokers. Kwon et al.<sup>15</sup> conducted a study on female textile workers in Shanghai, with their result indicating an increased risk of lung cancer not related to rotating night shift work, for both cumulative years (HR = 0.82, 95% [CI] 0.66-1.02) and cumulative number of nights (HR = 0.81, 95% [CI] 0.65-1.00).

**Breast cancer:** A total of four epidemiological studies from the selection of literature discuss the association between night/shift work and breast cancer, with

inconsistent results<sup>16</sup>. Pronk et al.<sup>16</sup> reported that breast cancer risk was not associated with ever having worked a night shift (HR = 1.0, 95% [CI] 0.9 to 1.2). Likewise Travis et al.<sup>19</sup> with three participants from the UK Study concluded that night shift work including long-term shift work had no effect on the incidence of breast cancer. Others, however, have identified a link between an increased risk of breast cancer and exposure to a long period of night-shift work<sup>17,18</sup>. Swedish twin studies involving participants under the age of 60 years exposed for more than >20 years showed (HR = 1.77, 95% [CI] 1.03-3.04), while shorter exposures to night shift work revealed no significant effect<sup>17</sup>. In the Nurses' Health Study II, the risk of breast cancer was found to be significantly higher in women with 20 years or more of shift work at baseline (HR = 2.15, 95% [CI] 1.23-3.73), although the same did not apply to the Nurses' Health Study I, in which women with 30 years or more of shift work did not have a higher risk of breast cancer (HR = 0.95, 95% [CI] 0.77-1.17) compared with those who had never done shift work<sup>18</sup>. The expert working group at IARC identified eight studies looking at night shift work and breast cancer, six of which noted a modestly increased risk of breast cancer among long-term night workers compared with those who were not engaged in shift work at night<sup>1</sup>. Two of these studies reported data from prospective studies of nurses engaged in night work. The first, from the Nurses' Health Study in the United States, estimated that nurses reporting  $\geq 30$  years of rotating night shifts were 36% more likely to get breast cancer than those who did not report working rotating night shifts (RR = 1.36, 95% [CI] 1.04-1.78). In the Nurses' Health Study II, those women who reported  $\geq 20$  years of rotating night shifts had an elevated risk of breast cancer compared with women who did not report working rotating night shifts (RR = 1.79, 95% [CI] 1.06-3.01).

**Other cancers:** Evidence was also examined from the epidemiological studies in the selection of literature with respect to the association between night/shift work and several other cancers, including ovarian cancer, bile duct cancer, and skin cancer<sup>20,21,22</sup>. Poole et al.<sup>20</sup> reported no association between the duration of rotating night shift work and the risk of ovarian cancer. Studies among Japanese men revealed no significant increase in the risk of bile duct cancer in shift workers (HR = 1.50, 95% [CI] 0.81-2.77); however, when the analysis was limited to extrahepatic bile duct cancer, significant associations appeared for shift workers (HR = 1.93, 95% [CI]

1.00-3.72)<sup>21</sup>. Heckman et al.<sup>22</sup> reported no significant association between shift work and melanoma (1.02, 95% [CI] 0.86-1.21), Basal Cell Carcinoma (0.93, 95% [CI] 0.90-0.97), and Squamous Cell Carcinoma (0.92, 95% [CI] 0.80-1.06).

## CONCLUSION

In conclusion, there is limited evidence of a causal association between night shift work and breast cancer, while there is insufficient evidence with respect to lung cancer, prostate cancer, and other cancers.

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# Analysis of Peripheral Neuropathy Disorders in Humans from Mercury Exposure: A Systematic Review

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## ABSTRACT

**Introduction:** Mercury is recognized as a global contaminant because it can travel long distance in the atmosphere, stay in the environment, accumulate in food webs, and cause severe adverse effects on human and ecosystem health. Exposure to mercury can affect peripheral nerve disorders and is usually found in populations exposed to workplaces with high mercury exposure. This study aims to analyze exposure of peripheral neuropathy in humans to mercury.

**Method:** This systematic review uses the PRISMA-P 2015 and keyword search using PICO-S technique.

**Results and Discussion:** We found that direct exposure of mercury to humans for less than six continuous months can cause peripheral neuropathy. Susceptibility factors affecting mercury poisoning are age, sex, type of work, immunity, length of stay, distance of residence to a mining location, distance of sources of clean water and sources of pollutants, smoking status, and consumption of fish.

**Keywords:** mercury; neuropathy; humans; systematic

## INTRODUCTION

Mercury (Hg) is a natural element found in the environment. Mercury is recognized as a global contaminant because it can travel long distance in the atmosphere, stay in the environment, accumulate in food webs, and cause severe adverse effects on human and ecosystem health<sup>(1)</sup>. In 2011, the amount of mercury emission worldwide was estimated at 1,400 tons every year. In the case of the small-scale gold mining industry, it is estimated that it involves between 12 million and 15 million people in more than 70 countries and generates 20% of the world's gold supply<sup>(2)</sup>. Human exposure to Hg can cause various health risks, with a degree of severity dependent largely on the magnitude of the dose. All forms of mercury are toxic, but the most dangerous one is in an organic form, methylmercury (MeHg), which is a neurotoxin. Acute mercury exposure can cause permanent damage to the nervous system resulting in a variety of symptoms<sup>(1)</sup>. The tragic events in Minamata and Niigata, Japan, where large populations suffered from MeHg from contaminated fish consumption, have dramatically shown the danger of mercury through the food chain and its risks to human health<sup>(3)</sup>. Recently there have been reports of unintentional acute exposures to

element mercury in school children due to broken bottles containing mercury in chemical laboratories in schools in different cities in Turkey<sup>(3)</sup>. The most prevalent health problems experienced by 166 respondents in Ratatotok sub district and its surroundings were cramps in the feet and hands (33.1%) and tremors (10.5%)<sup>(4)</sup>. Moreover, study results in Muara Angke, Jakarta, Indonesia, involving 160 respondents suggest that a number of respondents experienced clinical symptoms of chronic mercury poisoning in the forms of trembling on fingers, tingling on fingers and toes and often accidentally dropping, positive ataxia and tremor<sup>(5)</sup>.

The correlation between exposure to mercury and peripheral nerve disorders and impairments usually has been studied in occupationally exposed populations experiencing high mercury exposure<sup>(6)</sup>. Peripheral neuropathy or peripheral neuritis is a common neurological disorder that results from peripheral nerve damage. Peripheral neuropathy has a variety of causes, including toxic trauma, use of certain chemotherapy drugs, and mechanical injuries that cause compression or pressure<sup>(7)</sup>. Another important aspect of peripheral neuropathies is the presence of geographical and occupational distribution especially of toxic neuropathies

substances such as mercury, arsenic, lead where the main source is occupational exposure<sup>(8)</sup>. Although the neurological effects of organic mercury exposure are well defined, there have been no in vivo studies examining the mechanisms that cause neurological symptoms from mercury exposure<sup>(8)</sup>. This study aims to analyze mercury exposure to peripheral neuropathy in humans.

## METHOD

This systematic review used PRISMA-P protocol (Preferred Reporting Items for Systemic Review and Meta-Analysis Protocols) 2015<sup>(9)</sup>.

**Search Strategy and Study Selection:** Studies were collected through search in the source data from PubMed, Science Direct, Scopus, and EBSCO from January 2008 to August 2018. Keywords search used PICO-S (Population Intervention Compare Outcome-Study design) technique. By using search with keywords: (1) Mercury or Hg, (2) peripheral neuropathy, (3) humans, (4) analysis, (5) quantitative study.

**Study Inclusion Criteria:** The inclusion criteria of the documents that we consider appropriate (eligibility) for the systematic review are as follows: (1) targeted group: Mercury or Hg, (2) outcomes: peripheral neuropathy in humans, (3) research method: quantitative study, (4) studies written in English or Indonesian language.

**Study Exclusion Criteria:** We screened the title and abstract of studies that are not-full text and irrelevant. We considered aspects such as population, sampling, and method. If the documents are not included in PICO-S and do not discuss the exposure to mercury and its effects on peripheral neuropathic disorders in humans, they were also excluded. Furthermore, we only selected studies that were conducted between 2015 and 2018, as well as written in English and Indonesian language.

**Data Extraction:** Electronic database search was conducted for 30 days from 24 July to 24 August 2018. Screening was conducted based on relevance to the title and abstract of the full paper. Document selection process can be seen in Figure 1.

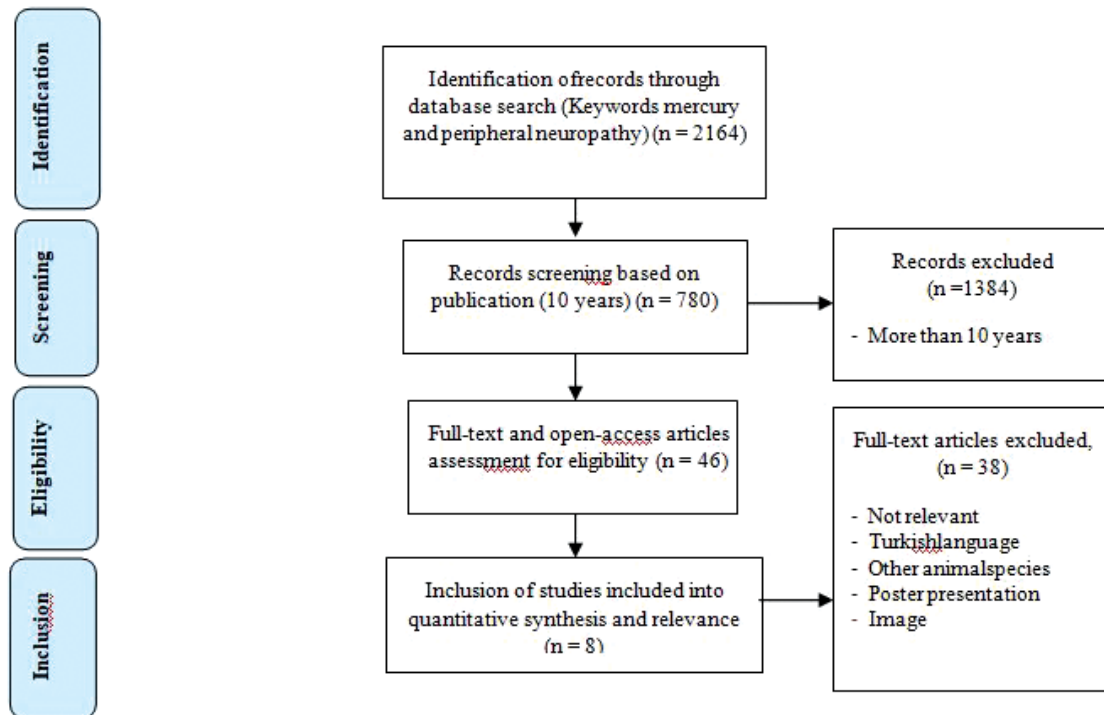


Figure 1: Preferred Reporting Items for Systematic Review

## RESULT

Amongst 2164 research, we found five studies that fit the inclusion criteria discussing mercury exposure to

peripheral neuropathy in humans. The studies included in this analysis were carried out in countries where there were cases of mercury and its effects on peripheral neuropathy. Four were case report studies, one of which

used a retrospective study design, two of which used a prospective study design, and one of which used observational studies. What the eight studies above have in common is that their independent variable consists of the central nerve system or peripheral nerve function. In addition, other variables are mostly similar, such as age, sex, previous mercury exposure history, demography, previous disease history, and BMI (Body Mass Index). The samples in this study are not limited in terms of age or sex. Based on the results, most are children in the age range between 2 and 18 years. As for adults, the age range is between 20 and 54 years. In average, the analyses used in these eight studies were bivariate analysis, followed by multivariate analysis using linear regression.

Some studies have shown cases of mercury poisoning with nervous system disorders, which in this case is peripheral neuropathy. The study <sup>(10)</sup> is a case report in which a man 35 year old, Latin American experienced an unstable gait, nausea, vomiting for more than 1 week and was followed by headache, diplopia, and vertigo. He claimed to have injected subcutaneous “quicksilver” smelters into his right shoulder a year earlier for “protection from a disease” as part of his Caribe culture. After that, a physical examination and examination of blood mercury levels in the laboratory revealed a serum mercury level of 84 ng/ml (normal <10 ng/ml) with random urine equivalent to mercury 371 µg/l. Eleven months after treatment, the serum mercury level was down to 7 ng/ml. Another case was also reported where two 13 year old twin sisters with pain throughout the body, especially the extremities and back, headache, cold, and sweating. Examination on mercury concentration in urine showed 50 and 70 µg/l for the both sisters, which were higher than normal threshold (<25 mg/l). After being investigated, his mother said they were using a compound containing mercury for pediculosis treatment 3 months ago which was used locally in the scalp<sup>(11)</sup>.

In a case control <sup>(12)</sup>, there was a significant correlation between exposure to mercury and central nervous system disorders with NSE, S100B, GRIA 1 results, and blood mercury levels significantly higher in the exposed group compared to the subjects who were not exposed (median value of NSE was 22.4 ng/ml, 17.2 n /ml; S100B 0.09 ng/ml, 0.08 ng/ml; GRIA 1 70.6 pg/ml, 54.1 pg/ml, and mercury levels in blood were 15.2 µg/l, 0.23 µ g/l for the exposed and unexposed groups, respectively). Similar

results show the impact of mercury exposure on the central nervous system, especially peripheral neuropathy found in case report studies<sup>(13)</sup>. The resulting data on 179 cases of mercury poisoning from mercury exposure in schools in two different provinces in Turkey show a positive correlation between duration of exposure and urine mercury levels<sup>(13)</sup>. Meanwhile, other studies report various clinical presentations of five family members exposed to mercury fluids through dermal contact and inhalation. Although rare, heavy metal exposure should be considered in patients who present symptoms involving multiple systems, including the skin, and the cardiovascular, respiratory, and neurological systems<sup>(14)</sup>. Observational study, there are reports of 2 cases of heavy metal poisoning from the inappropriate use of Chinese mineral medicine confirmed by toxicological investigations<sup>(15)</sup>.

The prospective studies show different results. There were no significant results because most p values ranged from 0.01 to 0.05. Although there was a possibility of false positives, the results showed little evidence of modification of the SNPs effect in the relationship between mercury biomarkers and peripheral nerve function at exposure to levels relevant to the US general population. Therefore, further research is needed to fully investigate the role of genetic polymorphism in development that is detrimental to neurological outcomes associated with mercury exposures<sup>(16)(6)</sup>. Of the results of the eight studies on mercury exposure to peripheral neuropathic disorders in humans, it was found that direct mercury exposure to susceptible human beings for less than continuous six months can cause peripheral neuropathy.

## DISCUSSION

Mercury is considered a dangerous metal because as an ion or in the form of certain compounds it is easily absorbed into the body. In the body, mercury can inhibit the function of various enzymes and can even cause cell damage<sup>(17)</sup>. Historically, the relationship between occupational exposure to mercury elements and peripheral nerve disorders has been reported populations. Ulnar motor nerve conduction velocity was significantly associated with long-distance elemental mercury exposure <sup>(6)</sup>. Mercury can also cause peripheral neuropathy, which affects the lower more than the upper extremities. Paresthesia with peripheral neuropathy

with muscle atrophy may also occur<sup>(18)</sup>. Evaluation of the comprehensive data for animals and humans shows that no nephrotoxic or clinically relevant neurotoxic effects are to be expected in humans at a biological value of 30 µg mercury/l urine<sup>(19)</sup>. In epidemiological studies in India, the overall prevalence of peripheral neuropathy varies from 5 to 2400 per 10,000 population in various community studies. Another important aspect of peripheral neuropathies is in terms of geographic distribution and work mainly from toxic neuropathies such as arsenic common in the Eastern belt; lead, mercury, and organo-phosphorus<sup>(8)</sup>.

There are several factors that influence the level of mercury in tissues: solubility and lipophilicity of Hg compounds, the balance between absorption and elimination rate, and the affinity of the binding of Hg compounds to tissues. The existence of very small amounts of Hg and sulfide ions can be released and damage the nervous system<sup>(20)</sup>. There are several factors that influence mercury poisoning, namely age, sex, type of work, immunity, length of stay, distance of residence to the mining location, distance of sources of clean water and sources of pollutants, smoking status and consumption of fish<sup>(21)</sup>. There are factors that determine the occurrence of adverse health effects and how severe health effects, which include the chemical form of mercury, dosage, age of the person exposed, duration of exposure, route of exposure and fish consumption pattern<sup>(22)</sup>. Compared to adults, children often reach much higher external mercury body concentrations in the same amount of exposure. This concept can be explained by five mechanisms: (a) heavy mercury vapor and settles, making the concentration higher on the ground where young children play; (b) blood barrier to the brain in children is less able to keep mercury out of the brain; (c) the rate of respiration of children is higher than that of adults, so children breathe in more mercury at the given concentration than adults; (d) their nervous system is still developing, which makes them more sensitive to mercury; and (e) children are also at risk because they are fascinated by seeing the element of mercury being spilled and therefore, more likely to handle it<sup>(13)</sup>. The effects on infants may be subtle or more pronounced, depending on the amount to which the fetus or young child was exposed. In cases in which exposure is relatively small, some effects might not be apparent, such as small decreases in IQ or effects on the brain that may only be determined by the use of very sensitive neuropsychological testing<sup>(23)</sup>.

The element of mercury has been misused for various purposes. Mercury has been injected intravenously for a suicide attempt. In this study, we also found that in Espiritismo, a spiritual belief system that is independent of Puerto Rico and the Caribbean Islands, as well as in the Afro Caribbean and other Latin American traditions, it is used to bring goodness and protect from the evil and jealousy of others<sup>(10)</sup>. A case of 5 families with elemental mercury poisoning due to inhalation of vapors and dermal contact. Mercury quickly evaporates and pollutes the air inhaled by the victim. Mercury glass thermometers can break in the mouth, causing inhalation and consumption of mercury. Although rare, researchers think that heavy metal exposure should be considered in patients who present multiple systematic symptoms, including the skin, and the cardiovascular, respiratory, and neurological systems<sup>(14)</sup>. Another case study showed patients suffered from chronic inorganic mercury poisoning, which affected mainly the patient's central nervous system and kidney. The patient has tremor, choreoathetosis, neurasthenia, erethism, sensory motor neuropathy, and ataxia and visual field disorders. Urine tests for N-acetyl-β-D-glucosaminidase (NAG) and β2-microglobulin were used to detect subclinical mercury toxicity<sup>(24)</sup>.

Different findings of the effect of SNP on outcome-biomarker relationships (urine and hair) are not surprising given that binding of heavy metals depends on several factors: amount of enzyme in the target tissue, mercury from the target tissue and redox chemistry of the enzymes. Inorganic mercury and MeHg differ in their target organs (kidney versus brain) and elimination routes (urine versus feces). Thus, the enzyme level is very compatible with the target tissue, which can contribute to differential modification<sup>(25)</sup>. Biomarkers are broadly defined as indicators that indicate events in biological systems or samples. Hair has been used as a biomarker for MeHg exposure. The use of mercury in umbilical cord blood has the advantage of being a measure more directly from fetal exposure, but the rate at term cannot reflect exposure to the original ear development stage. Meanwhile, blood and urine mercury levels have been used as biomarkers of acute and chronic exposure to high levels of inorganic and organic mercury<sup>(26)</sup>. There is a long history of evaluating neurophysiological and neuropsychological effects associated with mercury levels in blood, urine, and hair<sup>(24)</sup>. Limitations in this study may occur due to a lack of searching by the keywords used and the limitations in the data source used.

## CONCLUSION

Based on our review's result, it is found that there are potential effects of mercury exposure in peripheral neuropathy disorders, especially in humans. There are several factors affecting mercury poisoning. Children often reach much higher elemental body mercury concentrations in the same amount of exposure. Even so, despite the rare occurrence, we think that heavy metal exposure should be considered and protected from the start to prevent cases of mercury exposure.

**Conflict of Interest:** There is no conflict of interest to declare, including specific financial interests, relationships, and/or affiliations relevant to the subject matter or materials included.

**Ethical Clearance:** This systematic review study has been approved from the ethical review procedures stand point by the ethical committee at the Faculty of Public Health, Universitas Indonesia, and is declared feasible to be carried out with letter number 676/un2.f10/ppm.00.02/2018.

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# Accident Compensation and Disability Cash Compensation Utilization of Workers with Disabilities due to an Accident

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## ABSTRACT

**Introduction:** Workers who experience an accident is entitled to get accident compensation. The benefits of accident compensation are in the form of medical services and cash. Disability cash compensation that has been received by the workers is used for various matters. The objective of this study was to analyze the influence of the characteristics and the amount of cash compensation on the disability cash compensation utilization.

**Method:** This was a cross-sectional research. The participants was 182 workers with disability due to an accident in Sidoarjo Regency and Gresik Regency. The sampling technique employed was simple random sampling technique. The variables were the characteristics of the individual, the amount of disability cash compensation, and the disability cash compensation utilization. A questionnaire was used to obtain data. The data analysis was conducted using regression logistic ordinal test.

**Results:** Most of the participants are male and between the age of 40-49 years old. 54.4% of the participants received disability cash compensation of IDR 1 million – IDR 10 million. Most of them used the compensation to meet their daily needs. There was an influence of marital status and the amount of compensation on the duration of compensation utilization ( $p=0.000$ ). There was an influence of marital status on type of disability cash compensation utilization ( $p=0.048$ ).

**Conclusion:** This research showed that marital status and the amount of disability cash compensation had an influence on the disability cash compensation utilization. Participants still used the compensation for meet their daily needs. It didn't give benefit for long time.

**Keywords:** *workers with disabilities, characteristics, disability cash compensation utilization*

## INTRODUCTION

The impacts of accident include partial anatomical disability, partial functional disability, permanent total disability, and death. Disability can cause workers with disabilities to loss of their occupation<sup>1</sup> and income<sup>2</sup>. Disability also effect on their quality of life<sup>3</sup>.

Based on the Government Regulation of the Republic of Indonesia Number 44 of 2015, workers who encountered an accidents shall receive accident compensation<sup>4</sup>.

Social security is eminently vital to workers<sup>5</sup>. Compensation becomes the primary requirement for workers with disabilities to be able to live independently<sup>6</sup>. Therefore, the disability compensation received has to be utilized as best as possible to be able to support the formation of independence that affects the quality of life of the workers with disability<sup>12</sup>. Social security insurance maximizes the quality of life of a person with disability<sup>7,13</sup>

The objective of this research is to analyze the influence of characteristics and amount of disability compensation

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on the duration and type of disability cash compensation utilization of workers with disability due to accident.

**METHOD**

This research was a cross-sectional study. This research was conducted in Gresik Regency and Sidoarjo Regency. The research was started from January to April 2018.

The population used in this research was the workers with disability due to an accident in Gresik Regency and Sidoarjo Regency, Indonesia, who obtained accident compensation of the National Social Security for workers. The number of samples was 182 workers. Simple random sampling technique was used.

The authors collected both primary and secondary data. Primary data in this research was obtained by interviewing the workers with disability due to an accident who obtained work accident compensation of National Social Security for workers. Secondary data was obtained from documents of National Social Security for Workers in Gresik Regency and Sidoarjo Regency.

The independent variable in this research were the characteristics of individual and the amount of disability cash compensation, while the dependent variable was the utilization of disability cash compensation. Regression logistic ordinal test is used to analyze the influence within 2 variables. There were 4 categories of disability cash compensation utilization, namely daily needs, treatment and medication, savings, and business establishment.

**RESULTS**

**The Characteristics of Individual:** The individual characteristics within this study are age, sex, and marital status.

Age, one of the individual characteristics components, is analyzed in this research. Most of the participants were between the age of 40 – 49 years old. The youngest participant was 20 years old, and the oldest participant was 65 years old.

**Table 1: The Distribution of Respondents Age Categories**

Age Categories	N	%
20 – 29 years old	40	22
30 – 39 years old	47	25.8
40 – 49 years old	57	31.3
> 50 years old	38	20.8
Total	182	100

Most of the participants (73.6%) were male and 26.4% of them were female. Most of the participants were married (84.6%), 11% of the participants are single, and 4.4% of the participants were divorced.

**Accident Compensation:** The benefits of work accident insurance are in the form of medical services and cash that the workers receive when they obtain accident in the workplace. According to the result of the research, all of the participants receive medical services since they have obtained an accident until they were recovered. The participants received the medical services at the trauma centre clinic or hospital in collaboration with BPJS Ketenagakerjaan. However, the participants did not obtain psychological treatment. Accident greatly influenced the psychological condition of the participants. Most of them felt traumatic for the accident they had. In addition, participants often felt useless, worthless, insecure, and ashamed to socialize due to their disability condition.

**The Amount of Disability Cash Compensation:** The amount of disability cash compensation was varied and based on the level of disability and the monthly salary of the workers. The participants obtain the disability cash compensation that was ranged from IDR 600,000 to IDR 110,000,000.

**Table 2: The Distribution of the Amount of Disability Compensation**

Amounts	n	%
< 1.000.0000	7	3.8
1.000.000–9.999.999	99	54.4
10.000.000–19.999.999	31	17
20.000.000–29.999.999	15	8.2
30.000.000–39.999.999	11	6
40.000.000–49.999.999	5	2.7
≥ 50.000.000	14	7.7
<b>Total</b>	182	100

**The Utilization of Disability Cash Compensation:** The utilization of disability cash compensation was analyzed based on the duration and type of utilization. The duration of utilization is the length of time to utilize the disability cash compensation until the money runs out.

The duration of utilization is influenced by the amount of disability cash compensation received and the type of disability cash compensation utilization. Most

participants used it for about two to three months while only a small proportion of them used the disability cash compensation in a longer term.

**Table 3: Distribution of Disability Cash Compensation duration**

Utilization	N	%
<1 month	34	18.7
2-3 months	66	36.3
4-6 months	17	9.3
7-9 months	1	0.5
9-12 months	19	10.4
> 12 months	45	24.7
<b>Total</b>	182	100

Disability cash compensation received by the workers is used for various matters, such as saving, start a business, daily needs and medical treatment. Most (63%) participants used disability cash compensation to meet their daily needs and only 4% of them used disability cash compensation to start a business.

**Table 4: The Type of Disability Cash Compensation**

The utility of accident compensation	N	%
Daily needs	111	61
Medicine	16	8.8
Daily needs & Medicine	8	4.4
Daily needs & businesses	2	1.1
Daily needs & Saving	4	2.2
Savings & Medicine	4	2.2
Saving	30	16.5
Businesses	7	3.8
<b>Total</b>	182	100

**The Influence of Marital Status on The Duration and Type of Disability Cash Compensation Utilization:**

The statistical test using ordinal logistic regression showed there was an influence of marital status on the duration of disability cash compensation utilization ( $p=0,000$ ). Unmarried participants used the cash compensation in a longer term. The statistical test also showed there was an influence of marital status on the type of disability cash compensation utilization ( $p=0,048$ ). Participants with unmarried status used that cash compensation for saving. Married participants used that cash compensation money to meet their daily needs.

**The Influence of Amount of Disability Cash Compensation on duration of Disability Cash Compensation Benefits:**

The statistical test using ordinal logistic regression showed there was significant influence between the amount of cash compensation to the duration of disability cash compensation utilization ( $p=0,000$ ). Participants who had greater cash compensation used the money in a longer term with better benefit.

## DISCUSSION

**Characteristics:** Most participants were young and in the productive age category. They had a disability at a young age. Most participants were men and acted as the breadwinner of the family. Most (61,5%) participants had disabilities in their fingers. Fingers are vital organs frequently used in work. This greatly influences the participants' working abilities. Disability interferes work, social life, and ability to be independent<sup>8</sup>. Disability also limits the participant in the workforce and increasing financial burden<sup>9</sup>.

**Accident Compensation:** Work accident is an accident which occurs in an employment relationship, including accidents on the way from home to the workplace or otherwise and diseases due to the work environment<sup>2</sup>. The Indonesian Government provides protection for workers who experience work accident. The protection is regulated in the Regulations/Constitution.

According to Government Regulation No. 44 of 2015 concerns Work Accident and Death Compensation, disability is a state where the bodily function is reduced or lost or loss of limbs which are directly or indirectly results on the reduced or lost worker's ability to run his job<sup>4</sup>.

The benefits of Accident Compensation shall take the following form:

- A. Medical services according to medical needs, including:
  1. Basic and supporting check-up;
  2. First and advanced level of care;
  3. Inpatient in class I of the national public hospitals, regional public hospitals, or equal private hospitals;
  4. Intensive care;
  5. Diagnostic supporting;

6. Treatment;
7. Special services;
8. Medical devices and implants;
9. Doctors/medical services;
10. Operations;
11. Blood transfusion; and/ or
12. Medical rehabilitation.

B. Cash compensation for disability, including:

1. Reimbursement of Participant's transportation costs, in which the Participant suffers from Work accident or occupational disease, to the hospital and/or his home, including costs of first aid in the accident;
2. Temporary benefits while he is unable to work;
3. Compensation for anatomical partial disability, functional partial disability, and permanent total Disability;
4. Casualty compensation and funeral expenses;
5. Temporary compensation concurrently paid if the Participant dies or suffers from total permanent Disability due to Accident or occupational disease;
6. Rehabilitation costs, in the form of orthose and/or prothese;
7. Denture reimbursement; and/or
8. Scholarships for each deceased or suffered from total permanent Disability Participant's children in which such casualty or disability is due to work accident.

The medical services obtained by workers were based on medical needs. Participants shall be fully borne until recovered, including the rehabilitation. Participants are declared cured based on their physical condition. Participants did not get psychological recovery services. Participants considerably need health services not only to heal wounds, but also help them to eliminate psychological trauma from work accidents.

**The Amount of Disability Cash Compensation:** Participants received a variable amount of disability cash compensation. Calculation of the amount of disability compensation is regulated in the Government Regulation Number 44 of 2015. If participants experience disability from work accident, they shall receive Disability Compensation that includes:

- a. Anatomical partial Disability = % refers to table x 80 x monthly Wage

b. Functional partial Disability = % of the functional decrease x % refers to table x 80 x monthly Wage

c. Permanent total Disability = 70% x 80 x monthly Wage

**The Utilization of Disability Cash Compensation:** The results of the study on the utilization of disability cash compensation obtained by participants showed that 61% of the participants used disability cash compensation to meet their daily needs. They used the disability cash compensation because many of them experience a decrease in income during the recovery process.

In addition, 8.8% of participants used their disability compensation to continue treatment. According to the results of the interview, there were several participants who felt the need to continue the treatment, but they were already declared cured and able to start working again. 7.7% of the participants got disability compensation for more than IDR 50 million, but only 3.8% of them used the compensation to start a business. It is understandable that many workers do not have any additional skills apart from their previous job.

Nevertheless, the amount of disability compensation they received could not guarantee the continuation of workers and their family's lives. In the industry with a higher number of accidents/work-related deaths, many families did not have significant financial being after the accident happened. The loss of income due to accidents/death-resulted in the workplace creates susceptible financial difficulties in the family. It can lead to the significant and long-term effect on families, especially those whose children are still dependent<sup>10</sup>.

**The Influence of Marital Status on Duration and Types of Disability Cash Compensation Utilization:**

The participants who had marital status tend to spend the compensation relatively more quick (1-3 months). Whilst, the single participants could spend the disability cash compensation for a longer period (> 3 months). The participants who are married had the responsibility to meet their family's daily needs, thus the cash compensation ran out quickly and did not give long-term benefits. Then participants who are not married could save the cash compensation, so the cash compensation may provide long term benefits.

**The Influence of Amount of Disability Cash Compensation on the Duration of Compensation Utilization:**

The participants obtain the disability cash compensation for at least IDR 600,000 to IDR 110,000,000. The greater the compensation obtained, the longer participants may utilize the cash compensation.

The disability cash compensation will run out quickly if it is not utilized properly. Those who utilize the compensation money to meet daily needs ran out the money quickly and thus it did not give long-term benefits. The compensation money will provide long term benefits if the participants save the compensation money and use it to start a business. Most of the participants did not have any additional skills apart from their previous job. This case becomes an obstacle for participants to start a business. If they no longer have income, it will cause the dependence to the family. The dependence of the family affects on quality of life<sup>11</sup>.

## CONCLUSION

The majority of participants were male (73.6%) and between the age 20-65 years old. Some of the participants used the disability cash compensation to meet their daily needs. The participants received the medical services and disability cash compensation due to the disability from accident.

Marital status affects the duration and types of disability cash compensation utilization. The amount of disability cash compensation affects the duration of compensation utilization.

The suggestion that can be provided to the National Social Security for workers are giving mental health services and training to workers who experience disability due to an accidents.

**Conflict of Interest:** Nil

**Ethical Clearance:** Received from the Ethics Committee of the Faculty of Public Health, Airlangga University, Indonesia.

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# Use of Monitoring Cards to Increase Iron Substance and Hemoglobin Levels in Pregnant Women

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## ABSTRACT

**Background:** This study aims to monitor the use of added blood tablets in pregnant women in southern Kalimantan. Giving tablets added to blood is one of the critical efforts in the prevention and prevention of anemia. Giving blood booster tablets for pregnant women is at least 90 tablets during pregnancy.

**Method:** The study was conducted using *the quasi-experimental* method with a *pre-post test control group design*. The investigation began with the examination of hemoglobin levels (*pre-test*) and administration of blood enhancing tablets in three groups — the study sample of 120 pregnant women in 6 health centers in the Banjarmasin city area with a data collection period of 90 days.

**Results:** The results of the study averaged 0.2 g/dl Hb level increase; 20.8% of pregnant women obey consume blood-boosting tablets; there is no correlation between determinant factors for compliance with consumption of blood booster tablets; there is the influence of monitoring card for blood booster tablets on adherence ( $p < 0.001$ ), there are differences in the 3 groups ( $p < 0.032$ ), and there is an effect of monitoring cards on the consumption of blood booster tablets (0.009) and there are differences in Ministry of Health card groups with groups without card; there is a card effect on the difference in Hb levels ( $p < 0.019$  on the Ministry of Health card and  $p < 0.048$  on the research design card, there are differences in the impact of monitoring cards on the difference in Hb levels in the 3 groups ( $p < 0.028$ ), and there are differences in Hb levels in the group the design card of the researcher with the cardless group and there were differences in the increase in HB levels in all three groups ( $p < 0.013$ ) pressure

**Conclusion:** The blood tablet monitoring card affected the compliance of blood booster tablets and elevated hemoglobin levels

**Keywords:** *Tablets supplement, Hemoglobin levels, Card monitoring, Tablet blood booster*

## INTRODUCTION

In general 50% of cases of anemia due to iron deficiency <sup>(1)</sup>. The Department of Health of Republic Indonesia has been carrying out various activities handling of anemia since the early 1980s with the primary objective to reduce the prevalence of anemia in pregnant women to distribute tablets blood booster through district health center <sup>(2)</sup>. Giving blood booster tablets as one of the p efforts is an effective way to prevent

anemia because it can avoid and overcome anemia due to iron deficiency and folic acid. Blood booster tablets are tablets given to pregnant mothers given daily during their pregnancy or at least 90 (ninety) tablets with the composition of each tablet containing at least 60 mg of elemental iron and folic acid 0.400 mg. The incidence of anemia deficiency in pregnant women is caused by adherence of pregnant women to taking iron tablets<sup>(3)</sup>.

Generally, the main reason not to consume blood booster tablets, among others are due to forgetfulness, pills taste unpleasant, side effects, fear of a big baby and felt no need to. The most dominant factor related to the adherence of pregnant women to consuming blood booster tablets is the role of health workers, and other related variables are knowledge, family support, and drug availability.

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The preliminary study of 96 midwives in South Kalimantan with eight closed questions on the questionnaire and one open question showed that 44 people (46.3%) started giving blood-boosting tablets at the initial pregnancy visit, 81 people (85.3%) began giving blood-boosting pills at > 12 weeks of gestation with an average of 16 weeks' gestation ; 87 people (91.6%) provided 30 tablets for pregnant women; 92 midwives (96.8%) asked pregnant women whether pregnant women routinely take blood-boosting tablets; only 11 midwives (11.6%) reminded pregnant women to bring blood booster tablets the remaining pregnancy

revisits, and 88 midwives (91.6%) said they did not have a monitoring card for blood-boosting tablets.

## METHOD

The research design was *quasi-experimental* with a *pre-post test control group design*. The location of the study was in 6 health community centers in Banjarmasin City with a sample of 120 pregnant women who fulfilled the inclusion and exclusion criteria divided into 3 groups: 40 pregnant women without monitoring cards for blood-boosting tablets; 40 pregnant women with blood booster tablet monitoring cards and 40 pregnant women with blood booster tablet design monitoring cards.

## RESULTS

**Table 1: Compliance tablet consumption blood booster**

Sample Group	Disobedient		Lack of Discipline		Obedient		Total	
	F	%	f	%	f	%	F	%
Without card	16	40,0	15	37,5	9	22,5	40	100
Ministry of Health Card	1	2,5	30	75,0	9	22,5	40	100
Research Card	9	22,5	24	60,0	7	17,5	40	100
Total	26	21,7	69	57,5	25	20,8	120	100

Table 1 shows that obedient pregnant women consume blood-boosting tablets as many as 25 people (20.8%) and the average amount of consumption of blood booster tablets can be seen in table 2.

**Table 2: Consumption of Blood Add Tablets**

The composition of a blood booster tablet	$\bar{x}$	min	Max	SD
Fe-1 (1st month/30th Blood Pressure Tablet)	24,4	2	30	6,72
Fe-2 (2nd month/30th Blood Pressure Tablet)	25,3	3	30	6,63
Fe-3 (3rd month/30th Blood Pressure Tablet)	24,7	5	30	7,09
Total Fe (90 Blood Enhancing Tablets)	74,4	10	90	17,78

Table 2 shows that there are still pregnant women who do not adhere to consuming blood booster tablets, but there is an increase in the minimum amount of consumption of blood-boosting tablets every month, evenly -rata consumption of 75 tablets for three months of research (category of poor adherence).

**Table 3: Differences Influence Card Compliance Monitoring of the blood booster tablets Consumption**

Group	N	Mean Rank	Kruskal-Wallis Test	
			Statistically Count	$\rho$
Without card	40	52,58	6,874	0,032
Ministry of Health Card	40	70,39		
Research Card	40	58,54		



Table 3 shows the results of different test Kruskal-Wallis  $\rho$  0.032 ( $<\alpha$  0.05) there were differences in the level of adherence to consuming blood enhancing tablets in all three groups. The researcher conducted a further analysis to find out which group had the most influence on adherence to the consumption of blood improving tablets by anova test and use of blood booster tablets with a ratio scale. The results showed ANOVA different

test results  $\rho$  0.009 ( $<\alpha$  0.05) there were differences in the number of consumption of blood booster tablets in the 3 groups and the results of the *post hoc test* on the Tukey test there was a significant difference in compliance with the consumption of blood-boosting tablets in groups without tablet monitoring cards blood booster with a blood booster tablet monitoring card group.

**Table 4: Differences in the Effect of Monitoring Cards on Difference in Hemoglobin Levels**

ANOVA Test	F count 3,672	$\rho$ 0,028
Tukey Test: Without card	<ul style="list-style-type: none"> <li>● Ministry of Health Card</li> <li>● Research Card</li> </ul>	Mean Difference -0,5425 -0,6175*
Tukey Test: Ministry of Health Card	<ul style="list-style-type: none"> <li>● No Card</li> <li>● Research Card</li> </ul>	0,5425 -0,0750
Tukey Test: Research Card	<ul style="list-style-type: none"> <li>● No Card</li> <li>● Ministry of Health Card</li> </ul>	0,6175* 0,0750

Information \*) significant difference in mean on  $\alpha$  0.05

Table 4 shows the results of the different test ANOVA  $\rho$  0.028 ( $<\alpha$  0.05). The difference in hemoglobin level differences in the three groups and the results of the *post hoc test* on the Tukey test there were significant differences in hemoglobin level differences in the group without the blood card enhancing tablet monitoring card with the blood booster tablet monitoring group designed by the researcher (0.6175). In ANOVA test the difference in hemoglobin level did not pay attention to whether there was a decrease (-), fixed or increased (+), so the researcher conducted a Kruskal-Wallis difference test by changing the scale of variable data difference in hemoglobin levels which initially the ratio became ordinal (declining code 1; fixed code 2; and increased code 3). The results of the different test Kruskal-Wallis  $\rho$  0.013 ( $<\alpha$  0.05) there were differences in the difference in hemoglobin levels in the three groups.

**DISCUSSION**

WHO recommendations the composition of blood booster tablets containing 30-60 mg of elemental iron and folic acid 0.4 mg <sup>(4)</sup>. Blood booster tablets are tablets given every day during their pregnancy or at least 90 tablets. At least contain iron equivalent to 60 mg of elemental iron (in the form of ferrous sulfate, Ferro fumarate or Ferro gluconate) and folic acid 0.4 mg 3. The blood booster tablets distributed by the Banjarmasin city

health service to the health center are each membrane coated tablet containing Ferro sulfate exiccus 200mg (equivalent to fe element 60mg) and folic acid 0.25mg<sup>(5)</sup>.

The reason stated by the respondents not consuming 90 blood-boosting tablets in this study was due to forgetfulness and side effects of blood-boosting tablets in the form of nausea and dizziness. This is in line with previous research that many or at least consumption of blood-boosting tablets is determined by complaints of nausea and odor from blood-boosting tablets <sup>(6)</sup> — other factors that cause low levels of adherence to the use of blood booster tablets due to forgetfulness and the effectiveness of blood-boosting tablets, namely nausea and dizziness. Non-compliance occurs because pregnant women feel nauseous due to the taste and smell of tablets, besides the blood booster tablets are taken every day cause boredom so that pregnant women forget and are lazy to consume it.

Giving leaflets or counseling improves adherence of pregnant women with anemia to consume blood-boosting tablets and pregnant women in the leaflet group consume more protein every day than pregnant women in the counseling group. Based on this, at the beginning of the study, all respondents were given counseling about blood-boosting tablets and were provided with leaflets about blood-boosting tablets<sup>(7)</sup>.

The results of *chi-square* test in the three groups showed a value of  $p < 0.001$  ( $< \alpha 0.05$ ) which meant that there was an effect of monitoring cards on compliance with the consumption of blood booster tablets. The use of monitoring cards to drink blood-boosting tablets in the treatment group made respondents' motivation arise which encouraged someone to do positive. It can be seen in that there are differences in compliance with fe1, fe2, and fe3 in the three groups. In groups without cards there was a decrease in accordance with fe1 to fe2, which was 37.5% to 30% and fe3 32.5%; the Ministry of Health card group increased the respect of fe1 to fe2 which was 52.5% to 60%, but experienced a decrease in fe3 of 35%; while the research card group continued to increase compliance of fe1 to fe2 and fe3 namely 27.5%, 37.5%, and 60%.

Non-compliance occurs because the blood booster tablets are taken common cause boredom so that pregnant women forget and are lazy to consume it. The monitoring card for blood booster tablets as a medium used by pregnant women is important to remember so as not to forget to take blood booster tablets. Media is everything that can be used to channel messages or information so that it stimulates one's thoughts, feelings, attention and interests to do the process.

There was a significant difference in the adherence to the consumption of blood booster tablets in the group without the monitoring card for blood-boosting tablets with the monitoring group for blood booster. The monitoring card issued by the Ministry of Health was developed in the implementation of the program for giving and monitoring the quality of blood booster tablets for pregnant women in the area of community-based health and nutrition programs in 11 provinces in Indonesia, one of which is West Kalimantan province. The blood booster tablet monitoring card by the Ministry of Health can contribute to the level of adherence to taking 30 tablets of blood-boosting tablets by 39.1%. In addition, the message on the card provides information and knowledge to the respondent, namely due to lack of blood or iron nutritional anemia can cause 1) tired, lethargic and tired quickly; 2) decreased body resistance; 3) bleeding before and or during delivery; and 4) of miscarriage, premature and low birth weight<sup>11</sup>.

An increase in the average hemoglobin level of 0.2g/dl. Hemoglobin (Hb) is an oxygen-carrying compound in red blood cells<sup>(8)</sup>. Hb is composed of

multiple globins and heme proteins. One molecule Hb consists of four globin molecule and four heme, so that each Huk molecule has four iron atoms. The structure of this Hb molecule that can bind oxygen and iron must be in an induced form ( $Fe^{2+}$  or Ferro) In adults the blood volume in the body is around 5 liters. Each red blood cell contains 280 million molecules Hb. Every second the body must produce 2.5 million red blood cells<sup>(9)</sup>.

In pregnancy, the need for oxygen is higher so that it triggers an increase in erythropoietin. As a result, plasma volume increases and red blood cells increase. Increased plasma volume is higher than the rise in erythrocytes resulting in a decrease in Hb concentration due to hemodilution.<sup>(10)</sup> Plasma volume expansion which causes physiological anemia in pregnancy. Changes in Hb concentration are consistent with increasing gestational age. In the first trimester the level of Hb appeared to decrease and the lowest frequency in the second trimester and the third trimester there was a slight increase in Hb concentration, so the threshold level of Hb in the 1st and 3rd trimesters was 11g/dl and II trimester 10.5g/dl<sup>(11)</sup>.

The results of the examination of Hb levels in the three groups were recorded by enumerators in the research instruments (interview guidelines) and books for pregnant women, but in the group of cards the blood booster tablets of the researchers listed Hb levels, so that respondents felt motivated to increase Hb levels both through tablet consumption blood booster or eat foods that contain iron.

The results of the ANOVA different test  $p < 0.028$  ( $< \alpha 0.05$ ) and the results of the various test Kruskal-Wallis  $p < 0.013$  ( $< \alpha 0.05$ ) there were differences in the difference in hemoglobin levels in the three groups. The results of the *post hoc test* on the Tukey test showed significant differences in hemoglobin level differences in the group without the monitoring card for blood booster tablets with the blood booster tablet monitoring card group designed by the researcher (0.6175).

Monitoring card for blood booster tablets is an influential print media and becomes a motivating or motivating factor. Motivation is defined as an internal condition that arouses us to act, encourages us to achieve specific goals, and keeps us interested in certain activities. Understanding the motivation is something that supports someone to do, complete, stop and so on, an action to achieve specific desired goals of the motivation<sup>(12)</sup>.

## CONCLUSIONS

There were differences in adherence to the consumption of blood booster tablets in all 3 groups (the results of the test *Kruskal Wallis*  $\rho$  0.032  $<\alpha$  0.05) and the different effects of the ANOVA test ( $\rho$  0.009  $<\alpha$  0.05) and there were differences in the consumption of blood-boosting tablets in the group monitoring card for Ministry of Health blood booster tablets with groups without monitoring cards (test *tukey* 12,000 \*).

There is a difference in the effect of blood booster tablet monitoring card on the difference in Hb levels in the 3 groups (ANOVA test  $\rho$  0.028  $<\alpha$  0.05) and there is a difference in Hb level difference in the group blood booster tablet monitoring group design researcher with the group without monitoring card and the test results of *Kruskal Wallis* 0,013  $\rho <\alpha$  0.05 indicating no difference in Hb rate margin improvement in all 3 groups.

**Ethical Clearance:** Ethical clearance was obtained from The Ministry of Health Polytechnic Banjarmasin, Indonesia. We also wish to thank all the participants who contributed to this study.

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# The Gamma Nail Versus DHS in the Treatments of Intertrochanteric Fractures

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## ABSTRACT

Intertrochanteric femoral Fractures forms approximately one percent of all fractures. To assess the functional outcomes, operative time, period of union, blood loss, and complications of femoral neck fracture treated with gamma nail versus DHS we managed 124 patients with closed intertrochanteric fractures, AO type A1 and A2, during the period between October 2012 and October 2017 followed up for 12 - 24 months at al Sader Teaching hospital in Najef /Iraq. There were 62 cases treated by gamma nails method and 62 patients treated by dynamic hip screws (DHS). Functionally outcome was measured using Harris Hip Score, fluoroscopic exposure, operative time, blood loss, period of union, reoperation rate, weight-bearing time, with other parameters. Regarding gamma nail method, the outcome was excellent in 42 %, good in 45 %, and fair in 9.7% and poor in 3.3 % of cases, but with (DHS) method the outcome was excellent in 35.5%, good in 35.5%, fair in 19.3 % and poor in 9.7%. We concluded that the gamma nail fixation method is superior to the (DHS) fixation method.

**Keywords:** *Intertrochanteric Fractures, Incidence, Management, Gamma Nail, DHS*

## INTRODUCTION

The intertrochanteric femoral fractures are common, it can occur at any age but it has a bimodal peaks of age period of which falls into two groups, young age group usually after high velocity trauma and geriatric age (group those more than 60 years old) usually after low velocity injuries mostly falls and its incidence increases in frequency with advancing age due to osteoporosis<sup>1-5</sup>. With the aging of population in most of the world, its incidence is expected to increase over the future twenty years. For example 500000 cases of the hip fractures in USA are expected at 2040 and 16 billion is the expected to be the annual cost of their managements at that time, the intertrochanteric fractures are usually forms the half of the peritrochanteric fractures, half of the intertrochanteric fractures are unstable with advancing age and progressive low bone mineral density, the incidence of unstable intertrochanteric fractures tends to increase.<sup>6-10</sup> The women are subjected to this type of fractures more common than men in ratio 3:1. the mortality rate still 30% within 5 years after injury. Surgical treatment is the best strategy for treating intertrochanteric fractures as it permits functional recovery and early rehabilitation.<sup>11-14</sup> The complications of this type of fractures include mal-

union, delayed union, non-union, impaired hip rotation, Joint stiffness and osteoarthritis<sup>15-17</sup>

## PATIENTS AND METHOD

A prospective, comparative study of 5 years duration included 124 cases presented with femoral intertrochanteric fracture admitted in the Department of trauma and orthopedic in Al Sader hospital in Najef / Iraq. In 84 (67.7%) of the patients the force causing the fracture was simple fall (twisting injuries), 30 (24%) due to car accidents and 10 (8.3%) fall from height. Patients assigned into two groups with 62 patients in each, first group fixed by Gamma nail and the second fixed by DHS. Patient was excluded if he/she had one or more of the following

Pre-existing medical disorders that affect bone physiology like a malignant tumor, hyperparathyroidism, vascular insufficiency of the upper limb, alcohol or drug dependency and patients with polytrauma with an Injury Severity Score 25 of more than 16 points, those who expected that they would be unable to participate and or unable to continue, and those who involved in other clinical studies of a drugs or devices, pathological

fractures secondary to tumor, history of previous trochanteric fracture, cases subjected to previous surgery on the ipsilateral intertrochanteric fracture, pregnancy, open fractures, concurrent spinal cord injury or pelvic injuries, sciatic nerve palsies were excluded.

All patients were clinically examined and evaluated after full history taking. All required investigations were performed then the limb was carefully placed in skin traction. Tight bandaging was avoided. Then CT-scan was done for all patients. The operation was performed within first week in 104 cases (83.8%), and after 8 to 10 days following trauma in 20 cases (17.2%). A 68 cases were type A1 and 56 cases (45.2) cases were type A2 according to AO system classification.

In the theater, the operations were done under spinal or general anesthesia with supine position, the lower limbs lying on orthopedic table with fluoroscopic guide the fracture was manipulated to reduce any displacement of distal fragment. when the reduction was achieved, then we did either Gamma nail or DHS fixations. Preoperative antibiotics (single injection ceftriaxone 1 gram IV infusion within one hour before operation). All screws, plates and nails were placed in their optimal positions by aid of fluoroscopy. The blood loss, screening time, duration of the procedure and all technical difficulties, we faced, were noted. The drainage and transfusion requirements and postoperative hemoglobin level, were recorded. Anti-thromboembolic stockings were used in all patients with low molecular weight heparin for five days postoperatively. Acetaminophen and codeine were the only analgesics prescribed postoperatively. Depending on their medical condition, on the first or second postoperative day, all patients were discharged and they got out of bed, and walked partially weight-bearing with a walking frame. The walking sticks are allowed as soon as their medical condition allowed. The rehabilitative regime postoperatively was exactly same for the two groups and the physiotherapists being unaware of the fixation type. Patients followed up in subsequent visits at five days, ten days, two weeks for stitches removal, three weeks, six weeks, three months, six months, one year, eighteen months, two years.

The tool for assessing patients after around hip surgeries scored 0-100 and evaluated as followed 90-100 excellent, 80-90 good, 70-79 fair, 60-69 Poor and Below 60 Failed results

## FINDINGS

In group I the mean age was 51.8 years, 39 (62.9%) were females and 23 (37.1%) males. In group II 40 (64.5%) females and 22(35.5%) males and the mean age was 52.2 years with no statistically significant differences between both groups in age or gender. (Table 1). There is more fluoroscopic exposure intra-operatively with group one than group two. Regarding operative time and blood loss, both are double with the group two had greater blood loss and longer operative time than group one. the reoperation rate is more with group two than the group two especially with unstable intertrochanteric fractures. regarding the mean fracture healing time was 15 weeks (range 14-19 weeks) in group two while in group one it is 12 weeks (range 12-16). The mean of hospital stay for group two was 4 days while that of group one was 2 days. The mean Harris Hip Score for six months postoperatively for the group two was 80 while in group one 92. The maximum HHS score is of 100 points. The mean weight-bearing time was shorter with group one than group two. The infection rate was two case 3.1% with group one and four cases (6.25%) with group two all of them were superficial surgical site infection was treated well with oral antibiotics and local care. Delayed union of the fracture was reported in sixteen cases, six of which were with gamma nail method and ten cases in DHS method. The Mal-union, reoperation rate was lower with group one than with group two. The overall complication incidence was 8.2% in group one and 15.8% in group two, all the aforementioned findings are summarized in (Tables 2, 3 & 4)

**Table 1: Age and gender distribution of the studied groups**

Variable	Group I (Gamma nail)	Group II (DHS)	P. value
Age (mean) year	51.8	52.2	0.72
Female n(%)	39 (62.9%)	40 (64.5%)	1.00
Male n (%)	23 (37.1%)	22 (35.5%)	1.00

**Table 2: Shows the assessment scores of patients in both groups**

Score	Group I (Gamma nail)	Group II (DHS)
Excellent	26 (41.9%)	22 (35.5%)
Good	28 (45.2%)	22(35.5%)
Fair	6 (9.7%)	12 (19.4%)
Poor	2 (3.2%)	6 (9.7%)

**Table 3: Clinical outcomes of the studied groups**

Parameters	Group I (Gamma nail)	Group II (DHS)
Mean fracture healing time in weeks	12	15
Mean hospital stay (day)	2	4
Mean Harris Hip Score for 6 months	92	80
Mean operative time (minutes)	55	108
Mean blood loss (ml)	122	290
Mean fluoroscopic exposure (shots)	35	48
Mean weight-bearing time (day)	32	60

**Table 4: Postoperative complication**

Type of complication	Group I (Gamma nail)	Group II (DHS)
Delayed union	6 (9.7%)	10 (16.1%)
Mal-union	2 (3.2%)	6 (9.7%)
Surgical site infection	2 (3.2%)	4 (6.3%)
Reoperation rate	2 (3.2%)	6 (9.7%)

## DISCUSSION

Intertrochanteric fractures of the distal radius have increased in frequency because of aging population. osteoporosis and medical illnesses are another contributing factors which increases the risk of patients falling. Gamma nails and DHS by plate and screws is not a new methods for treatment of intertrochanteric and it has been widely used by different surgeons with different results, the best of which is when the reduction was checked per-operatively before ending of all procedure and when the stable reduction is achieved and maintained. gamma nail as a type of fixation method provide sound method for intertrochanteric fractures treatments specially unstable type.

Sandeep Thomas George, et al in 2017 who took smaller sample (78 patients) than our study with 30 months duration, he used same Harris Hip Score for evaluation of his results. he agreed with our results as he stated that the DHS method of fixation is not optimal procedure for intertrochanteric fracture<sup>17</sup>.

Xi Yu, et al, 2018, in his recent meta-analysis study who reviewed 2653 patients with different type of fixation whether intramedullary or extramedullary. he agreed with our study as he noted that less incidence of deep infection, reoperation, and failure of implant with intramedullary device but with same incidence of other complications. he disagrees with our study in that the postoperative hip mobility was better extramedullary devices<sup>1</sup>.

Li AB et al, 2017 in his meta-analysis study, he studied 1,543 patients in Eleven randomized controlled trials, he had found, like what we found, that there is good functional and less blood loss with intramedullary fixation while No obvious differences were found in other adverse events, blood transfusion, operative time, and hospital stay between extramedullary and intramedullary fixations<sup>18</sup>.

Zhang Y et al, 2017, in his literature review and meta-analysis study of 2431 patients with average age 74 years, with same of the functional score used in our study, he agreed with our study in that the long gamma nail has a good results regarding the operative time, blood loss and hospital stay and good functional outcome.<sup>19</sup>

Dunn J et al, 2016, in his literature review which involve 1276 cases in 135 papers, he used mostly similar parameters of our study like estimated blood loss, transfusion rate, reoperation rate, secondary femoral shaft fracture rate, operative time and length of stay. He recommended the gamma nails as best choice for intertrochanteric fractures<sup>20</sup>.

Parker MJ, Handoll HH, 2008, in their study, they disagree with our study in that they notice that there is high incidence of operative and later femoral fractures and more reoperation rate<sup>21</sup>.

Hao Z et al, 2018, in his systematic review study, his sample was 3097 case in 24 papers, he agrees with our results in that the Gamma nails had good functional outcome with lower rate of blood loss shorter operative time<sup>22</sup>.

Airirachakaran A et al, 2017, in his meta-analysis study, with a parameters similar to that in our study with similar results of our study.<sup>23</sup>

Wang W1, et al, 2018, 158 cases. With shorter follow up period but with similar parameters and statistical test. he agreed with our results regarding all parameters except the fracture healing time, he found no significant statistical differences between these two groups but in general he put the gamma nail in superior position.<sup>24</sup>

## CONCLUSION

We concluded that gamma nail fixation is superior than DHS fixation specially for unstable intertrochanteric fractures fixation as it is associated with less incidence of overall complication rate and early return to usual daily activity.

**Ethical Clearance:** Signed informed consents obtained from all participants and data collected in accordance with the WMA Declaration of Helsinki

**Conflict of Interests:** None

**Source of Funding:** None

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# Detection Enteric Viral in the Newborn Causes Diarrhea in Al-Zahraa Hospital of Al-Najaf Government

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## ABSTRACT

Diarrhea is of great concern in children under the ages of five. In developing countries, multiple incidence of diarrhea can lead to critical problems. We tried to evaluate role of immunochromatographic assay (ICA) to detect the members of viral gastroenteritis in 120 child of both gender, aged 2-3 years presented with diarrhea, between December 2017 to April 2018 at Al zahra Maternity and Padiatric Teaching Hospital - Najaf, Iraq. Fecal Samples were collected and examined using immunochromatographic assay (ICA). The main findings revealed that 62 (51.6%) viral gastroenteritis cases, one virus- alone included Adeno virus, Astro virus, Noro virus and Rota virus found in in (26.6%), (17.7%), (13.3%) and (42.2%), of patients , respectively. Co-infection with four virauses reported in (6.6 %), three viruses in (11.1%), two viruses; Adeno and Rota virus in (15.5%), Noro and Rota virus in 2 cases (4.4%), one case had Adeno and Asto virus (2.2%). In conclusion: the study proved that highest percentage of viral gastroenteritis was Rota virus, and the incidenc of co-infection was also reported included Adeno with Rota viruses , Noro with Rota viruses, and Adeno with Astro virus.

**Keywords:** *Diarhea, Adeno virus, Astro virus, Noro virus and Rota virus.*

## INTRODUCTION

Millions of lives of young children are lost annually to acute gastroenteritis, most of them in developing societies. Gastroenteritis is a common case for submission to general practice or emergency departments and admission to hospital in developed countries <sup>1</sup>. Simply put, Diarrhea is the passage of frequent faeces usually in liquid form (with increased water content). The patterns of the stool in diarrhea vary widely among young children, and changed from the norm. About 3-5 billion acute gastroenteritis cases that result to 2 million live lost annually have been reported worldwide. This affects children younger than five <sup>2</sup>.

Viral gastroenteritis occurs with similar frequencies in developing countries, but seasonal are different from one area to another <sup>3</sup>. Very few data available from iraq, especially in Al najaf city. The Few existing data is the ususally recorded as rotavirus (Family; Reoviridae) and Norovirus (Family, Caliciviridae) <sup>4-5</sup>. Thus, there is almost no data about other viruses Such as the virus human viral viruses (Astroviridae)in iraq. These viruses are highly transmissible, primarily Via the oral fecal route, by eating or Food is also polluted from person to person by Airborne drops.

Norovirus is represented as the second most important causative agent of childhood diarrhea after rotavirus ,but it is estimated that the importance of it will increase in the future, as a result of routine application of Rotavirus vaccination <sup>6</sup>.

Adenovirus have been linked to acute diarrheal diseases and are responsible from 3.2 to 12.5% of the world's cases in childhood and and the detection ratio is higher in developing countries,. Intestinal viruses

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including the norovirus virus, adenoviruses were infected the intestinal cells and mainly affected children under two years of age, leading to watery diarrhea, so, if left untreated, can cause severe dehydration<sup>7</sup>.

The aim of this study was to identify Rotavirus, Astro, Norovirus and Adenovirus amongst kids with diarrhea admitted to AL- Zahra teaching hospital for maternity and children, Al-Najaf governorate. Iraq.

## MATERIALS AND METHOD

**Study population:** From December 2017 to April 2018, a prospective study was conducted on diarrhea samples from a total number of 90 patients ranging from 2 to 3 years of age including both sexes at maternity and Padiatric Teaching Al zahra Hospital - Najaf, Iraq. Macroscopic and microscopic laboratory examinations were criedout. The inclusion criteria involed in this study is watery stool samples (at macroscopic examination). Neither bloody stool nor parasitic agents containing sample were considered.

**Immunochromatographic assay:** All samples collection were collected in a labeled streile tube and tested by immunochromato graphic assay (CerTest, Spain) for antigenic expression of Astrovirus, Adenovirus, Rotavirus and Norovirus consistent with the manufacturer's instructions.

Stool samples were Homogenized as possible prior to preparation, approximately 125 microliter of diarrheic sample was dringed by sterile micropipette then put in collection tube containing stool samples and diluents. The tube was shaken in order to assure good sample dispersion. Four drops were dispensed in CER test circular window of card (Figure 1).

**Reading Results:** Appearance of colored bands were read after 10 minutes. While negative results were indicated by only one green band (control line), all the positive samples for viral gastroenteritis had in addition to the green band, a red band as well as a side result line. Absence of the green colored band regardless the appearance or not of the results lines (red color) in samples was evaluated as invalid result

**Statistical analysis:** All results were analyzed by ANOVA test, and Chi square test at the level of significant when p- value < 0.05. the statistical analysis was performed using SPSS program.

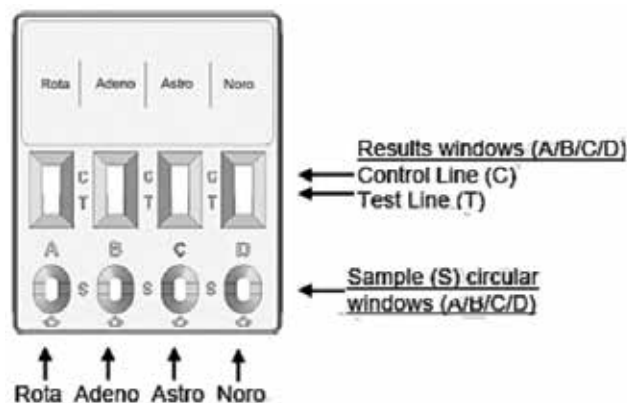


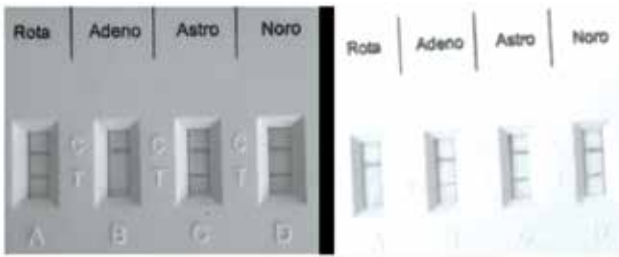
Figure 1: One step CERTEST card test before its use

## FINDINGS

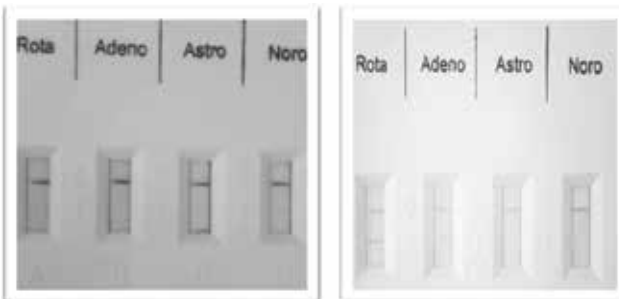
The distribution of the studied group according to the detected viruses; single viral infections were Rota virus as the more frequent detected virus accounted for (42.2%), Adenovirus (26.6%), Astrovirus (17.7%) , Norovirus (13.3%). Coinfection was Rota&Adeno virus (15.5%), Adeno&Astro&Norovirus (11.1%), Noro&Rotavirus (4.4%), and co-infection of four viruses in (6.6%) (Table 1 and Figures 2,3 & 4). Gastroenteritis viruses have been identified as the most important cause of the disease, however, there are four categories of viruses are being clinically related; Norovirus (family Caliciviridae), Rotavirus (family Reoviridae), Adenovirus and Astrovirus. Clinical rotavirus infection is most often associated with children aged between 6 months and 2 years. Our results indicated that three viral co-infection achieved in Al-zahrah hospital. In the same results our study illustrated the other two viral co-infection Rota and Adenovirus.

Table1: Shows the number of viruses that infected the children in our country

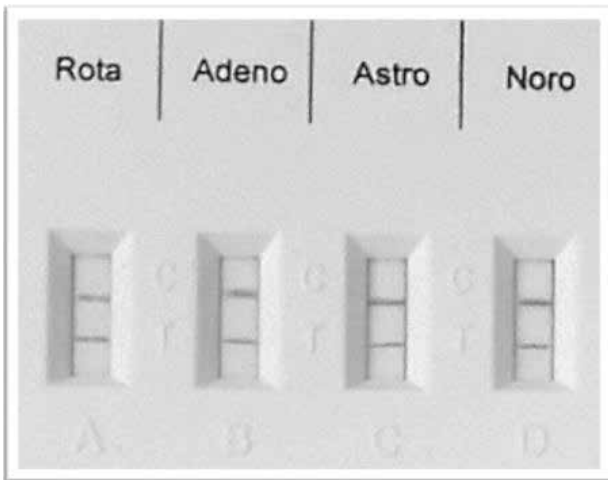
Name of viruses	Total	%
Rota virus	19	42.2
Adenovirus	12	26.6
Astrovirus	8	17.7
Norovirus	6	13.3
Rota&Adeno virus	7	15.5
Adeno&Astro&Norovirus	5	11.1
Noro&Rotavirus	2	4.4
Four viruses	3	6.6



**Figure 2: Two viral sections kit test illustrate three viral infections; left section shows Rota, Astro and Noro virus coinfection, right section shows Adeno, Astro and Norovirus coinfection**



**Figure 3: Two viral sections kit test illustrate two viral infections; left section shows Rota virus and Adenovirus coinfection, right section shows Rota virus and Norovirus coinfection**



**Figure 4: Four viral types coinfection shows as Rota, Adeno, Astro and Norovirus**

## DISCUSSION

Acute gastroenteritis has thought to be wide spread among young children. Moreover, the dehydration that has been associated with it is the main reason for admission to the hospital in industrialized countries. Acute diarrhea is a major health problem worldwide and a major source of death in developing countries<sup>8</sup>. The present study showed the most significant etiological viral

agent were group A rota virus and Adenovirus, regarding as 42.2% and 26.6%, this result was agreement with previous study<sup>9</sup>, who were documented that Rotavirus and adenoviruses are the predominant causative agents of acute infantile gastroenteritis. Adenovirus infection may cause disease of the upper respiratory tract, particularly in children under 3 months of age, certainly, in the patient have combined immunodeficiency (CID)<sup>10</sup>. The mortality in these children is 12% overall 9 of 74 patients to 19% overall 7 of 36 patients, out of children with high risk for infection<sup>12</sup>. Rotaviruses are a major cause of severe childhood gastroenteritis in developing countries including Asia, it is estimated that there are 2.3 million hospital admissions and about 527,000 deaths among those aged less than five years due to rotavirus<sup>14,15</sup>. Immunocompetent patient normally develop subclinical or mild forms of disease, the course of disease is 10 to 56 days<sup>(11)</sup>. Disease is most often associated with neonates and can result in significant fluid losses in bloody diarrhea. The virus primarily infects adsorptive cells of the intestinal villi with resulting diarrhea, The clinical severity of the infection depends on factors such as age, viral virulence, the presence of passive immunity, and secondary infection<sup>13</sup>. Transmission of Astrovirus and Norovirus is via feco-oral route, by contact with patients, contamination of recreational and drinking water and also environmental contamination<sup>16</sup>, aerosol contamination from projectile vomit and also through food-borne transmission<sup>17</sup>. Some previous study on molecular assay reported significant frequency of norovirus and adenovirus within children of ages ranging from 1–2 years. The strength of the red color bands in the test lines (T) within the results windows vary with antigen concentration present in the specimen. Yet, this test is not able to determine either the quantitative value or the rate of increase in antigens<sup>18</sup>. The results also showed two gastrointestinal viral co-infection Rota and Norovirus. The results regarding the reported co-infection in the present study agreed that reported in previous studies who was found that in young children, Rota virus and norovirus coinfection manifested as diarrhoea (81%), and fever (66%) while During rotavirus infection, fever was present in 97% of cases and 81% of them were >38°C<sup>18</sup>

## CONCLUSION

This study highlights the spread of diarrhea causing, viral pathogens in children below the age of

five. Astrovirus, norovirus, adenovirus and rotavirus have been found common in such group of patients. Immunochromatographic assay Lead to improved laboratory diagnosis of these viruses.

**Ethical Clearance:** All official agreement were obtained, signed informed consent obtained from parents of the included children. Data collected in accordance with the World Medical Association (WMA) Declaration of Helsinki as a statement of ethical principles for medical research involving human subjects

**Conflict of Interest:** Author declare none

**Source of Funding:** Self-funded

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# Effectiveness of Video Assisted Teaching Programme on Toilet Training of Toddlers among Parents in a Selected Rural Area in Shimla, Himachal Pradesh, India

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## ABSTRACT

**Introduction:** The family is the central focus in the life of toddlers. A toddler in turn exerts considerable influence on all other family members, regardless of the size and form of the family unit. As the toddlers begin to interact with others outside the family, the parents help the child to conform to the expectations of the society. The most important societal demand made on the child during this period is the control of elimination<sup>5</sup>.

**Materials and Method:** In order to achieve the objectives of the study, a pre experimental study approach was adopted for the study. Purposive sampling technique was used to select the sample. The sample consisted of 40 parents of toddlers. The main study was conducted in the Anganwadi, situated in Shimla area. The data collected were systematically tabulated to facilitate the data analysis. The collected data analyzed by using descriptive and inferential statistics.

**Results:** The analysis of the demographic variables revealed that majority (40%) of the participants are in the age group of 26-30. The assessment of the knowledge among parents on toilet training revealed that majority (60%) of the parents had moderate knowledge, 35% had poor knowledge, and five percentages had good knowledge.

The overall mean knowledge score was  $14.03 \pm 2.665$ , with a mean percentage of 46.75. % revealing that the overall knowledge of the parents regarding toilet training is moderate. The assessment of the Effectiveness of video assisted teaching programme on toilet training revealed that the total mean knowledge score is increased by 25.83% with mean  $\pm$  SD of  $7.75 \pm 2.55$  after the administration of Video assisted teaching programme. The cumulative frequency distribution of pre-test and post test knowledge scores shown in the O gives shows significant difference between the pre-test and post test scores. The knowledge pre-test median was 13.50 where as the post test median score was 21.50. It shows a difference of 9 in knowledge. Association between pre-test knowledge with demographic variables revealed that there was significant association between the pre-existing knowledge with these demographic variables on toilet training

**Conclusion:** The experts suggests that it is easier to train a child on toileting skills when he/she is at least 18 months old, and for boys it is better to wait even longer since they usually lack the necessary language and fine motor skills. This time frame is much easier to use because of the child wanting to please his/her parents<sup>11</sup>

**Keywords:** *Effectiveness, Video assisted programme, Toilet training, Toddler*

## INTRODUCTION

Today's society is complex and ever changing. Growing up emotionally is complicated and difficult under any circumstances<sup>4</sup>. Children are blooming buds. They are important asset of nation. Children are expected to grow and learn to their fullest potential. Parents serve as advocates for children in order to meet needs of all

children for access to education and health care process<sup>4</sup>.

All the stages in human life are exposed to challenges, difficulties and success as a gain. One of such stages is the toddler period. Fundamental learning process develops in the child as the child begins to seek autonomy and explores the world. It learns how to tolerate, express desires and develop relationships<sup>7</sup>.

## MATERIALS AND METHOD

The objectives of the study were to a) Determine the existing knowledge of parents regarding toilet training using a structured knowledge questionnaire b) Find the effectiveness of video assisted teaching programme on toilet training among parents using the same structured knowledge questionnaire. c) Find the association between pre-test knowledge scores of parents on toilet training with selected demographic variables.

In view of the nature of the problem under study and to accomplish the objectives of the study an evaluative approach was found to be appropriate to describe the effectiveness of video assisted teaching programme on toilet training among parents of Toddlers.

Pre-experimental, i.e., one group pre-test post-test design was adopted for the study. Here only one group was observed twice, before and after introducing the independent variable. The effect of treatment would be equal to the level of the phenomenon after the treatment minus the level of phenomenon before treatment. In this study the Video assisted teaching programme on toilet

training was the independent variable. Dependent variable is the effect of action of the independent variable and cannot exist by itself. The study was conducted at Anganwadi in Shimla which is a rural area under Surathkal PHC. The samples were selected using purposive sampling method. The population and the sample selected for the study comprised of 40 parents of toddlers staying in Shimla's rural area at Himachal Pradesh.

## RESULTS

**Part I: Description of demographic characteristics of the parents of toddlers:** The demographic data shows that majority (40%) of the participants are in the age group of 26-30. Among participants most (52.5%) of the parents has high school education. Highest (90%) of the samples were females. Majority of the participants (80%) are Hindus and 20% are Muslims. Most of them (57.5%) were having two children and 67.5% of them have second child as toddler. All the participants have received information regarding toilet training and among them 40% got information from elders, relatives or friends.

### Part II: Knowledge of parents regarding toilet training.

**Table 1: Percentage and distribution of level of knowledge of parents regarding toilet training**

Range of score %	Level of knowledge	Number of respondents	Percentage (%)
0-12	Poor	14	35
13-18	Moderate	24	60
19-24	Good	2	5
25-30	Very good	0	0
Total		40	100

Data in the Table 1 show that majority (60%) of the parents had moderate knowledge, 35% had poor knowledge and five percentages had good knowledge. Nobody had very good knowledge.

**Section B: Area-wise analysis of the knowledge scores:** This part deals with area-wise mean, SD and mean percentage of pre test knowledge scores of parents regarding toilet training

**Table 2: Area-wise mean, SD and mean percentage of pre test knowledge scores of parents regarding toilet training**

Areas	Minimum score	Maximum Score	Mean	SD	Mean%
Area I	1	9	5.70	2.233	57
Area II	3	8	5.80	1.324	41.43
Area III	0	2	1.25	0.588	41.67
Area IV	0	3	1.28	0.716	42.50
Overall knowledge	9	19	14.03	2.665	46.75

Data in the Table 2 revealed that parents had highest knowledge in the Area I that is, Meaning of toilet training and its Readiness with a mean percentage of 57% followed by Area II which is do's and don'ts of toilet training & Guidelines for night time control with a mean percentage of 42.50%, then the Area III that is, the effects of faulty toilet training practice with a mean percentage of 41.67%, and least in the area IV that is, in the steps of toilet training with a mean percentage of 41.43%.

### Part III: Effectiveness of video assisted teaching programme on toilet training.

**Section A: Area-wise, Mean, SD, and Mean percentages of pre test and post test:** This part deals with Area-wise Mean, SD, and Mean percentages of pre test and post test knowledge scores

**Table 3: Mean, SD, Mean difference of pre test and post test**

Areas	No. of items	Knowledge score								
		Pre-test(A)			Post-test (B)			Effectiveness (B-A)		
		Mean	SD ±	Mean %	Mean	SD ±	Mean %	Mean	SD (±)	Mean %
Area I	10	5.70	2.233	57	8.18	1.412	81.75	2.48	2.30	24.75
Area II	14	5.80	1.324	41.43	9.20	1.181	65.71	3.40	1.39	24.29
Area III	3	1.25	0.588	41.67	2.10	0.709	70	0.85	0.66	28.33
Area IV	3	1.28	0.716	42.50	2.30	0.516	76.67	1.03	0.86	34.17
Total	30	14.03	2.665	46.75	21.78	2.616	72.58	7.75	2.55	25.83

The data presented in the Table 3 shows that the total mean knowledge score is increased by 25.83% with mean  $\pm$  SD of  $7.75 \pm 2.55$  after the administration of Video assisted teaching programme.

Comparison of the area wise mean and SD of the knowledge scores showed that, the effectiveness of video assisted teaching programme in the area of 'Meaning of toilet training and its Readiness' had 24.75% increase in the mean percentage knowledge scores with the mean and SD of  $2.48 \pm 2.30$  was observed with that of 57% in pre-test and 81.75% in the post test.

**Section B: Comparison of level of knowledge in pre-test with post test and effectiveness of the study:** This part compares level of knowledge and mean of pre test and post test and it also deals with mean difference in pre test and post test and 't' value thus finds the effectiveness of the study. To evaluate the effectiveness of video assisted teaching programme, a null hypothesis was formulated. A paired 't' test was used to find the effectiveness. The value of 't' was calculated to analyses the difference in knowledge score of parents in pre-test and post-test.

$H_{01}$ : There is no significant difference between the pre-test and post test mean knowledge of parents on toilet training

**Table 4: Comparison of level of knowledge and effectiveness in pre-test with post test and effectiveness of the study**

Level of Knowledge	Pre-test		Mean	Post-test		Mean	Mean Difference	t-test
	Frequency	Percentage		Frequency	Percentage			
Poor	14	35		0	0			
Moderate	24	60	14.03	5	12.5	21.78	7.75	19.23*
Good	2	5		30	75			
Very good	0	0		5	12.5			

$p < 0.05$ ; \* = Significant



The data presented in the Table 4 show that the pre-test knowledge level of all the parents was Moderate 60%, poor 35% and good 2%, and post test knowledge level very good 12.5%, good 70.5% and moderate 12.5%.

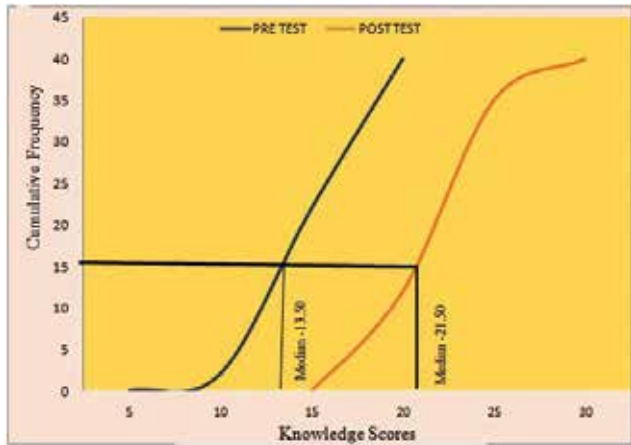


Figure 1: O give of the pre-test and post-test knowledge scores of parents regarding toilet training

The data presented in figure 1 ie: - the O gives shows significant difference between the pre-test and post test scores. The knowledge pre-test median was 13.50 where as the post test median score was 21.50. The O give plotted shows that the first quartile score of post-test is higher than third quartile score of pre-test. This indicates that there is a significant increase in the knowledge of parents regarding toilet training

**Part IV: Association between Pre-test knowledge scores of parents on toilet training with selected demographic variables:** Chi-square test was computed to test the association between the knowledge of the subjects and selected demographic variables; the following null hypothesis was formulated.

$H_{02}$ : There will be no significant association between knowledge score with selected demographic variables.

Table 5: Association between pre-test knowledge with demographic variables

N = 50

Demographic variable	$\chi^2$	Knowledge		
		df	p-value	Inference
Age	0.102	1	0.749	NS
Education	1.071	1	0.301	NS
Gender	0	1	1	NS
Religion	0	1	1	NS
No: of children	1.071	1	0.301	NS
Birth order of the toddler	1.20	1	0.273	NS
Occupation	0	1	1	NS
Type of family	0	1	1	NS
Monthly income	0.156	1	0.693	NS
Any previous information on toilet training	0	1	-	NS
Source of information	5.104	1	0.024	S

Table value= 3.84, df=1, S = Significant; NS=Not significant

Data presented in Table 5 reveals that the calculated chi-Square value of source of information (5.014) is greater than that of table value (3.84) at 0.05 level of significance, hence the null hypothesis can be rejected and concluded that there was significant association between the pre-existing knowledge with these demographic variables on toilet training.

**DISCUSSION**

**Level of knowledge of parents regarding Toilet Training:** Majority (60%) of the parents had moderate

knowledge regarding toilet training. None of the participants had very good knowledge. The findings of this study were supported by a study conducted in Korea Toilet training status of Korean toddlers and their mother’s knowledge of toilet training. The result shows that 68% of mothers are unaware of proper toilet training techniques. There was a significant correlation between toilet training and mother’s level of knowledge on toilet training<sup>3</sup>.

**Area-wise analysis of the knowledge scores:** The area-wise analysis revealed that the parents scored highest in the area of Meaning of toilet training and it’s Readiness

(Mean percentage 57%). The area-wise analysis revealed that the parents scored lowest in the area of steps of Toilet Training (Mean percentage 41.43%).

The study findings were supported by a descriptive study conducted on 'the knowledge and practices regarding the toilet training among mothers of preschool children in a selected urban community at Bangalore city. The highest mean knowledge (78.3%) found in the aspect of physiological readiness followed by psychological readiness (67.1%)<sup>6</sup>

**Effectiveness of video assisted teaching programme on toilet training:** The results shows that the total mean knowledge score is increased by 25.83% with mean SD of  $7.75 \pm 2.55$  after the administration of Video assisted teaching programme. Hence it is concluded that there is very highly significant gain in knowledge of parents on toilet training after the video assisted teaching programme. The study findings were supported by a pre experimental study on 'the effectiveness of a planned teaching program on toilet training to mothers of children between one to three years of age in selected day care centers at Mangalore. The researcher reaches the conclusion that a planned teaching program helps to improve the knowledge of mothers regarding toilet training<sup>8</sup>.

**Quartile distribution of pre-test and post-test knowledge score of parents regarding toilet training:** The plotted "o" gives show significant difference between the pre-test and post test scores. The knowledge pre-test median of knowledge was 13.50 where as the post test median score was 21.50. Hence it is concluded that there is very highly significant gain in knowledge of parents on toilet training after the video assisted teaching programme.

**Association between Pre-test knowledge scores of parents on toilet training with selected demographic variables:** There was significant association between the knowledge and the demographic variables.

The null hypotheses were rejected. The study findings were supported by a cross sectional study was done to determine the association of toilet training with child and environmental factors in USA. Significant factors predicting toilet training completion were older age, non Caucasian race, female gender and single parenthood<sup>9</sup>.

## CONCLUSION

Learning to use the toilet is a big event in a young child's life—a sure sign of growing up. Most of the

children are eager about learning how to use the "potty" and are quite proud of their achievement. The parents need guidance in recognizing the signs of readiness, in helping their child achieve the necessary skills and in addressing the problems when they occur. Proper toilet training will help to make a well disciplined hygienic generation<sup>12</sup>

**Conflict of Interest:** Nil

**Source of Funding:** Self

**Ethical Clearance:** Taken from the college of nursing ethical committee.

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# ***Ex vivo* Cytopathic Effect Study of Human *Acanthamoeba keratitis* and Use of *E. coli* in Parasitic Culture**

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## **ABSTRACT**

*Acanthamoeba* is free living amoeba and can cause *Acanthamoeba keratitis*, a serious disease which affects the cornea. It is widely existing in fresh water and soil. *Acanthamoeba* has three phases during the life cycle; trophozoite and a resistant double walled cyst and protocysts. The pathogenesis starts when the trophozoites bind to the surface of cornea by expressing mannose-binding protein which can bind to mannose glycoproteins on the corneal surface. The contaminated contact lenses can increase the infection by increasing the binding ability of the trophozoites. This project aimed to study the cytopathic effect of different stages *Acanthamoeba keratitis*. Study strains of *Acanthamoeba castellanii* (ATCC 50370) was cultured and seeded in Hep2 cell lines. *E. coli* (strain M12) was used to isolate the trophozoites. The third stage, protocysts was made using Neff's medium. The cytopathic effect was checked trophozoites invasion to monolayer cells cultured in a small flask and in 24 well tissue culture plate. The time of destroying Hep2 cells by the trophozoites is less than that of other *Acanthamoeba* stages. The double ring-shaped cell wall of the cysts may increase the time-kill of Hep2 due to their resistant which was very slow to hatch. Reactivating the trophozoites from cysts then seeding in Hep2 destroyed the cells at less time compared fresh trophozoites as the virulence of the reactivated trophozoites being higher. The result could suggest that the infection of corneas with reactivated trophozoites may be more complex. Finally, the study found that the number of the trophozoites can limit the cytopathic effect of *Acanthamoeba*.

**Keywords:** *Acanthamoeba keratitis*, trophozoites, protocysts, cysts, cytopathic effect, *E. coli*, cornea

## **INTRODUCTION**

*Acanthamoeba keratitis* is a serious disease which affects the cornea and caused by a genus of free living amoeba called *Acanthamoeba*, widely existing in fresh water and soil<sup>1</sup>. *Acanthamoeba* has two phases during the life cycle: a vegetative infective stage (trophozoite) and a resistant double walled cyst<sup>1</sup> and recently an intermediate stage was discovered and known as protocysts<sup>2</sup>. *Acanthamoeba* is an aerobic protozoon. It can be cultured in axenic agar (Ac#6) which contains

yeast extract, peptone and glucose<sup>2,3,4</sup>. It could also grow and isolate in Non-Nutrient Agar (NNA) plates which are seeded with *Escherichia coli*<sup>5</sup>.

The pathogenesis of *Acanthamoeba keratitis* starts when the trophozoites binds to the epithelial tissues of cornea. *Acanthamoeba* trophozoites can express mannose-binding protein on their surfaces which can bind to mannose glycoproteins on the corneal surface<sup>6,7,8</sup>. Traumatic injuries can increase the adhesive ability of *Acanthamoeba* as the injuries could increase mannose glycoproteins expression<sup>6</sup>. The trophozoites could be transmitted to the cornea via the contaminated contact lenses which can increase the binding ability of the trophozoites to the corneal membrane<sup>9</sup>. In addition, the number of acanthopodia, tooth like structures come out from the amoeba surfaces, can play an important role in the pathogenesis of the parasite by increase the adhesive

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ability to the cornea surface<sup>7,8</sup>. Invasion of the trophozoites to epithelial layer of cornea leads to penetration the Bowman membrane which can be mediated by cytolysis, phagocytosis and apoptosis<sup>10</sup>. In addition, presence of sucker like structures, amoebastomes, on the surface of *Acanthamoeba* can increase the corneal cells phagocytosis by the amoeba<sup>7</sup>. Furthermore, trophozoites secrete several kinds of proteases such as serine proteases, cysteine proteases, metalloproteinases, elastase, collagenolytic enzyme, phospholipase A and a novel plasminogen activator<sup>11,12</sup> which increase the invasion and destroy the connective tissues, stroma<sup>13</sup>. Impairment the corneal stroma can lead to blindness<sup>14</sup>. The successful treatment of *Acanthamoeba* keratitis depends on its stage of the infection. In case of earlier diagnosis, debridement of the epithelium is effective to eliminate the infection<sup>6,15</sup>.

This project aimed to study the cytopathic effect of different stages *Acanthamoeba* keratitis as the pathogenesis is largely unknown. The study objectives would include maintenance of Hep2 and Vero tissue culture cell lines and their preparation in microtitre culture plates for adhesion assays. In addition, the objectives can be involved culture and maintain of *Acanthamoeba* (trophozoites, mature cysts and protocysts) to perform cyto-pathogenicity assays.

## MATERIALS AND METHOD

**Trophozoites culture:** Study strains of *Acanthamoeba castellanii* (ATCC 50370) were grown in tissue culture flasks [Nunc surface (small 25 cm<sup>2</sup> and medium 75 cm<sup>2</sup> flasks) and Corning (large 225 cm<sup>2</sup>)] containing semi defined axenic medium (Ac#6).

**Isolation and Maintenance of trophozoites:** Trophozoites were isolated using Non-Nutrient Agar (NNA) plates seeded with *E. coli* (strain ATCC 8739) then maintained and refreshed weekly in Ac#6 media by smacking a small flask which contains the trophozoites. The flask was stored at room temperature to get confluent within 24-48 hours.

**Bacteriological aspect:** Bacterial stock of *Escherichia Coli* (M12) stock was grown on nutrient agar plate using streaking methods then incubated overnight at 37 C. A colony of *E. coli* was used to plate on MacConky agar for checking the vitality of bacteria as a selective media for *E. coli*. 10 ml of nutrient broth tube has been inoculated with a colony of bacteria on MacConky plate

for overnight culture at 37 C. Density of *E. coli* was examined using Spectrophotometer at OD600 (0.5 -0.8). 3 drops of the bacterial suspension was added to NNA plates and used for isolation of the parasite.

**Encystment of trophozoites:** Axenic mature *Acanthamoeba* cysts were produced by encysting trophozoites on 2.5% Non-Nutrient Agar (NNA) plates. Firstly, they were grown in Ac#6 in a large 225 cm<sup>2</sup> tissue culture flask at 28C° (± 2°C). 200µl of aliquot were spread over five ENNA plates and the plates were incubated for 48 hours at 28°C (± 2°C) and then sealed in polyethylene bags for continued incubation for a further 5 days. After 7 days incubation, the presence of mature cysts formed on the ENNA plates were observed microscopically. A sterile swab moistened with ¼ Ringer's solution in order to harvest the cysts from each plate by rubbing and rotating the swab across the plates.

**Making protocysts:** Two milliliters of Ac#6 containing trophozoites were added to 100 ml of Neff's encystment medium<sup>16</sup> in a storage bottle. It was put in a shaking incubator in 32 °C at 100 rpm and checked at hourly intervals of 2, 4, 6 to 24 hours. Finally, 50 µl/ml of calcaflour white was added to protocysts and incubate at 37 °C for an hour to see the light blue circles under the fluorescent microscope. Thereafter, the protocysts were counted using haemocytometer and stored in a specimen tube at 4 C° until the use.

**Tissue culture technique:** Hep2 cell lines (Carcinomic human cells) were used in the study. The cells were cultured into a small flask which was contained 10ml of Eagle's Minimum Essential Medium. After that, it was incubated at 36°C in 5% CO<sub>2</sub> for 1-2 days until confluent.

**Cytopathic effect assays (CPE):** Checking of trophozoites invasion to monolayer cells cultured in a small flask:

Trophozoites virulence was detected by using a small confluent tissue culture flask with Hep2 cells. The trophozoites of 50370 *Acanthamoeba* were cultured in new growth media then mixed gently and transferred again onto a small semi confluent (80-90%) tissue culture flask. The trophozoites time-kill of the cells was recorded using haemocytometer counting and photos were taken under a microscope. The count was done randomly by counting the number of intact cells in 10 different fields of each flask under the microscope (100x).

**CPE of Acanthamoeba's trophozoites in 24 well tissue culture plate:** A 24-well tissue culture plate was mostly confluent with Hep2 cells were used to check Acanthamoeba CPE. Firstly, growth media of the plate was changed with maintenance media (0.5 ml per well). Fresh *Acanthamoeba* trophozoites of strain 50370 were added to 24 well plates and incubated in CO<sub>2</sub> incubator. The time-kill for monolayer destroying was recorded and the count was done randomly.

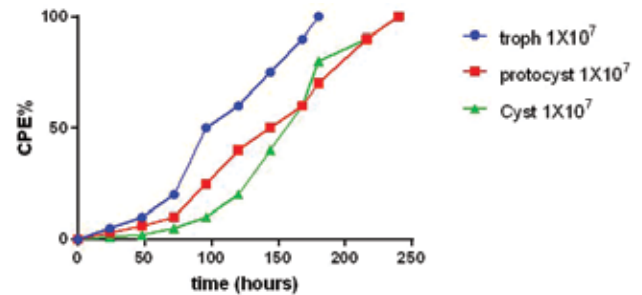
### STATISTICAL ANALYSIS

All values of counting were arranged and tabulated in Microsoft Excel program. Results were expressed as mean  $\pm$  S.E.M. Statistical analysis was performed (t-test, one-way ANOVA) in GraphPad Prism version 7, P-value <0.05 was considered as significant.

### RESULTS AND DISCUSSION

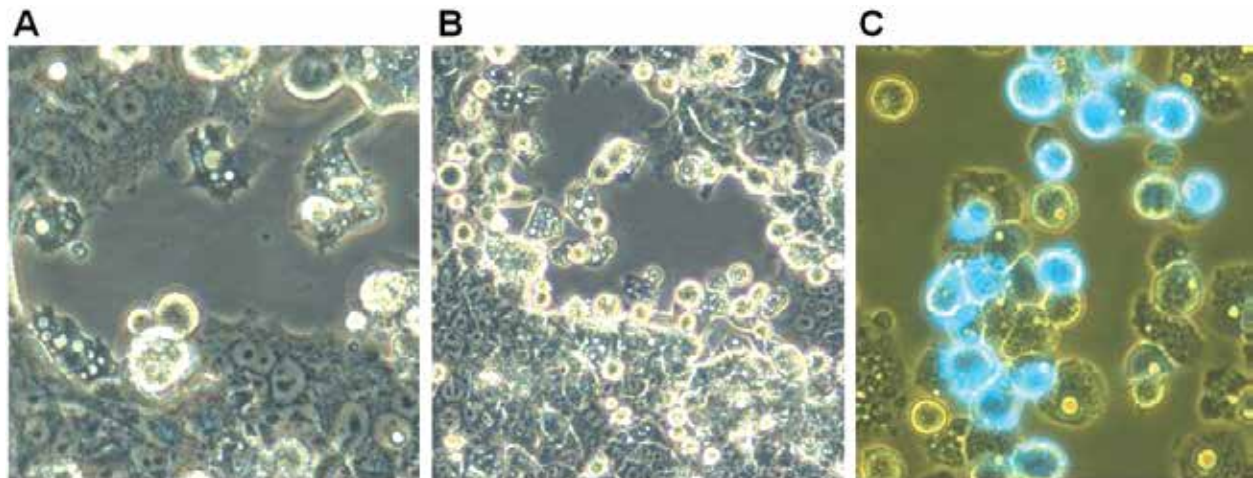
Trophozoites of *Acanthamoeba keratitis* were cultured in Ac#6. From that cultured stage, protocysts were made in Neff's PG medium and cysts were made in NNN agar. These stages were added to Hep2 cell line and the cytopathic effect was checked by randomly counting the number of intact cells of 10 different fields at different times and concentrations. Trophozoites of *Acanthamoeba keratitis* at concentration of  $1 \times 10^5$ /ml destroyed all the Hep2 cells cultured in flask after 180 hours compared to the time-kill of the protocyst and cyst at the same concentration ( $1 \times 10^5$ /ml) which destroyed the cells after 240 hours of trophozoites being seeded onto epithelial cells (Figure 1 and Figure 2). These results were similar to the results obtained when the same stages

were cultured in 24 well plate but the time-kill was less as the number of Hep2 cells is much lower in case of the plate compared to the small flask (Figure 3 and Figure 4). The results in both figures showed significant differences between the different times of killing when One sample t test was used. This can confirm that the trophozoites are more virulence than other stages. This is clear as the virulence depends mainly on the presence of acanthabodia, vacuoles and adhesive proteins which found and produce in the trophozoites. The time-kill of the mature cysts were the largest (Figure 1 and Figure 3) perhaps due to their resistant double ring-shaped cell wall which was very slow to hatch.



**Figure 1: Cytopathic effect of trophozoites, cysts and protocysts of *Acanthamoeba keratitis* on Hep2 cells cultured in small tissue culture flask**

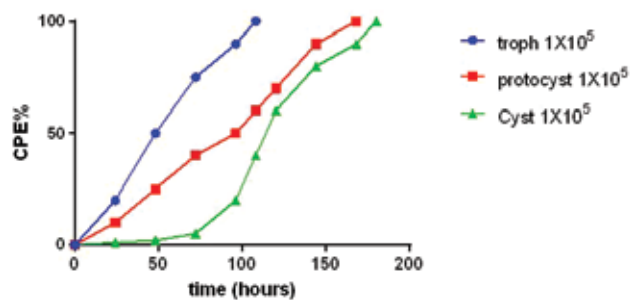
Different stages of *Acanthamoeba keratitis* were added to Hep2 cells cultured in small flask and incubate at 36 °C in 5% CO<sub>2</sub>. The time-kill of Hep2 by the parasite stages was recorded by checking the intact cell count using haemocytometer. Statistical analysis between the different time-kill points for each protozoan stage was done using One sample t test. Data are the means  $\pm$  SEM from three independent experiments carried out.



**Figure 2: Different stages of *Acanthamoeba keratitis* on Hep2 cells cultured in small tissue culture flask**

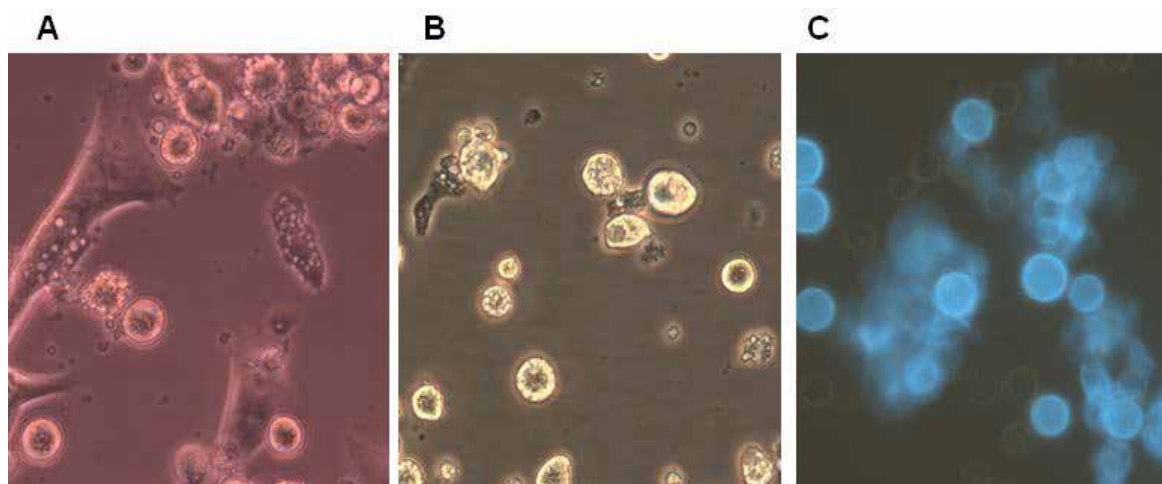
Different stages of *Acanthamoeba keratitis* were added to Hep2 cells cultured in small flask and incubate at 36 °C in 5% CO<sub>2</sub> then examined after 2 days under the microscope (100X).





**Figure 3: Cytopathic effect of different *Acanthamoeba keratitis* stages on Hep2 cells cultured in 24 well tissue culture plate**

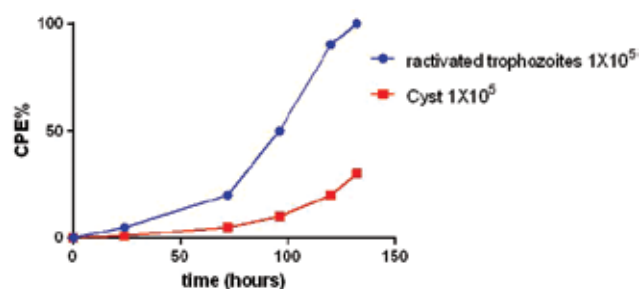
Different stages of *Acanthamoeba keratitis* were added to Hep2 cells cultured in 24well plate and incubate at 36 °C in 5% CO<sub>2</sub>. The time-kill of Hep2 by the trophozoites, cysts and protocysts was recorded by counting the number of intact cells using haemocytometer. Statistical analysis between the different time-kill points for each parasitic stage was done using One sample t test. Data are the means ± SEM from three independent experiments carried out.



**Figure 4: Different stages of *Acanthamoeba keratitis* on Hep2 cells cultured in 24 well plate**

Different stages of *Acanthamoeba keratitis* were added to Hep2 cells cultured in 24 well plate and incubate at 36°C in 5% CO<sub>2</sub> then examined after 2days under the microscope (100X).

The cysts (1 X 10<sup>5</sup>/ml) destroyed 30% of the epithelial cells after 132 hours of its inoculation (Figure 5). However, when these Cysts were reactivated to trophozoites and seeded in the cell culture, 100% of the cell lines were destroyed at the same time (Figure 5). This result was statistically different when t test was used to compare between the two columns. Compared to the killing activity of the trophozoites, the time-kill of reactivated trophozoites (Figure 5) was less than that of trophozoites in Figure 1. This may be because the increase in virulence of the reactivated trophozoites. This result could suggest that the infection of corneas with reactivated trophozoites may be more complex as the trophozoites become more pathogenic.



**Figure 5: Comparisons of cytopathic effect of *Acanthamoeba keratitis* cysts and reactivated trophozoites on Hep2 cells cultured in 24 well tissue culture plate**

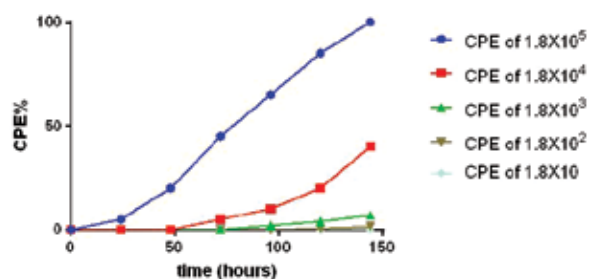
Cysts of *Acanthamoeba* with different concentrations starting at 1.8X10<sup>5</sup> were added to Hep2 cells cultured in 24well plate and incubate at 36 °C in 5% CO<sub>2</sub>. At the same time, some cysts were reactivated to produce trophozoites by putting the cysts in Ac#6. Then these reactivated trophozoites were added to Hep2 cells cultured in 24well plate and incubate at 36 °C in 5% CO<sub>2</sub>. The time-kill of Hep2 was recorded by checking the number of intact cells using haemocytometer. Statistical analysis between

the tim-kill of cysts and reactivated trophozoites was done using t test. Data are the means  $\pm$  SEM from three independent experiments carried out.

To check whether the number of the trophozoites can limit the cytopathic effect of *Acanthamoeba*, different concentrations of trophozoites were seeded in 24 well plate cell culture at the same time. The time-kill was checked at different times (Figure 6). The result explained that trophozoites at concentration of  $1.8 \times 10^5$  and  $1.8 \times 10^4$  destroyed 100% and nearly 50% of the cells respectively after 144 hours which showed significant differences using One way ANOVA (Figure 6 and Table 1). However, other concentrations did not show high killing activity.

Trophozoites of *Acanthamoeba* with different concentrations starting at  $1.8 \times 10^5$  were added to Hep2 cells cultured in 24well plate and incubate at 36 °C in 5% CO<sub>2</sub>. The time-kill of Hep2 by the trophozoites was recorded by checking the number of intact cells using haemocytometer. The tim-kill of different trophozoites concentration was analysed using One Way ANOVA. Data are the means  $\pm$  SEM from three independent experiments carried out.

This suggests that the number of the trophozoites play an important role in *Acanthamoeba* pathogenesis.



**Figure 6: Comparisons of cytopathic effect of *Acanthamoeba keratitis* trophozoites with different concentrations on Hep2 cells cultured in 24 well tissue culture plate**

**Table 1: Statistical significance difference (One Way ANOVA) of cytopathic effect of different concentrations of *Acanthamoeba keratitis* trophozoites**

Tukey's multiple comparisons test, One Way ANOVA	Mean Diff.	95.00% CI of diff.	Significant?	Summary	Adjusted P Value
CPE of $1.8 \times 10^5$ vs. CPE of $1.8 \times 10^4$	35	5.802 to 64.2	Yes	*	0.0126
CPE of $1.8 \times 10^5$ vs. CPE of $1.8 \times 10^3$	43.86	14.66 to 73.06	Yes	**	0.0012
CPE of $1.8 \times 10^5$ vs. CPE of $1.8 \times 10^2$	45.43	16.23 to 74.63	Yes	***	0.0008
CPE of $1.8 \times 10^5$ vs. CPE of $1.8 \times 10^1$	45.71	16.52 to 74.91	Yes	***	0.0008
CPE of $1.8 \times 10^4$ vs. CPE of $1.8 \times 10^3$	8.857	-20.34 to 38.06	No	ns	0.9021
CPE of $1.8 \times 10^4$ vs. CPE of $1.8 \times 10^2$	10.43	-18.77 to 39.63	No	ns	0.8367
CPE of $1.8 \times 10^4$ vs. CPE of $1.8 \times 10^1$	10.71	-18.48 to 39.91	No	ns	0.8230
CPE of $1.8 \times 10^3$ vs. CPE of $1.8 \times 10^2$	1.571	-27.63 to 30.77	No	ns	0.9999
CPE of $1.8 \times 10^3$ vs. CPE of $1.8 \times 10^1$	1.857	-27.34 to 31.06	No	ns	0.9997
CPE of $1.8 \times 10^2$ vs. CPE of $1.8 \times 10^1$	0.2857	-28.91 to 29.48	No	ns	>0.9999

**Conflict of Interest:** This research is a personal non-profit work and there is no conflict of interest.

**Source of Funding:** None.

**Ethical Clearance:** Ethical clearance was obtained from the Faculty Scientific Committee (Department of Parasitology, College of Veterinary Medicine, Al-Muthanna university, Iraq) to Investigate the *Ex vivo* cytopathic effect study of human *Acanthamoeba keratitis* and use of *E. coli* in parasitic culture.

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# Teacher's Perception of Stakeholder Support in the Peer Education Program about Drug Abuse Prevention

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## ABSTRACT

The school environment is responsible for shaping student behavior through both curriculum and extra-curricular activities. One of the positive activities that must be done is prevention of drug abuse which is still high in the eastern Surabaya and central Surabaya. Schools form peer educators as an effort to empower students through collaborating with stakeholders to carry out the sustainability of the program. The purpose of this study was to determine teacher perceptions related to stakeholder support in the peer education program in 10 schools in Surabaya area. Data were analyzed using descriptive qualitative studies. The results of interviews conducted by the researcher to 10 teachers as peer educator counselors stated that stakeholder support for the peer education program was still limited to informative support and instrumental support. Whereas for emotional support, social networking support and reward support have not been done by the stakeholders.

**Keywords:** *teacher's perception, peer education, drug abuse prevention*

## INTRODUCTION

Overcoming the abuse of narcotics and illegal drugs in adolescents is the responsibility of the school as a provider of quality education and also the responsibility of the government and other stakeholders that facilitate the sustainability of the school programs. In Law Number 35 of 2009<sup>[1]</sup>, all activities related to drugs will be the responsibility of the government. Then the regulation is transmitted to the National Narcotics Agency, which is a Non-Ministerial Government Institution (LPNK), which has jurisdiction under the President and is responsible to the President. The National Narcotics Agency has the duty to coordinate relevant government agencies in formulating policies and implementing them in the field of availability, prevention and eradication of illicit abuse and circulation of narcotics, psychotropic substances, precursors and other addictive substances especially in the education environment.

Based on data obtained through BNN of East Java Province that the number of drug abuse in 2016 reached 568,304 people, while in the city of Surabaya, the number of drug abuse reached 364 people and dominated by teenagers.

To realize a quality and capable of bringing about adolescents, the government created a prevention program for the dangers of drugs through peer counselors as stipulated in Mayor's Regulation Number 65 of 2014 in the Implementation of *Sekolah Bersih Narkoba* (Drugs-free School).

Based on interviews with teachers in several Surabaya High Schools, stated that in 2014 the Surabaya City Education Service held a Peer Educator program in several schools with the aim that students who were peer educators were able to embrace friends away from drug abuse behavior. In the program, students as peer educators are given training that also works with stakeholders from both the National Narcotics Agency, the Health Office and the Police.

The program is said by the counseling teacher as a peer educator guide that only runs for one year. However, the program is no longer running. The peer educator program in several schools was formed at the initiative

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of the school in various ways such as the establishment of health ambassadors until the election through students participating in the school organization.

The commitment of the regional government is the main motive in the prevention and treatment of drugs in the education environment. With the existence of regional programs that focus on P4GN in adolescents, all stakeholders are expected to be able to commit and work together in a comprehensive and integrated manner in order to realize an educational environment that is far from drug abuse.

In this study the researcher wanted to see the support given by stakeholders to the High School in Surabaya regarding the program to prevent drug abuse in students based on the teacher's perception as a peer educator in the school environment.

## METHOD

The method in this study uses a qualitative descriptive approach where the researcher is a key instrument and emphasizes meaning rather than generalization. In this case, researchers want to explore the phenomena related to drug abuse programs that are given to students through the solid angle of teacher perceptions of stakeholders.

**Informant:** In this study, the researcher selected 10 teachers who served as peer educator assistants from 10 high schools in the Surabaya City area. The researcher chose a sample in the Surabaya area because there was a peer education program in the school, but drug abuse was still rampant.

The peer educator teacher was the key informant in this study. The researcher takes data by conducting in-depth interviews with each teacher to explore information from a group of subjects. Determination of informants with purposive sampling that has certain characteristics in accordance with the objectives of the study.

## FINDINGS

The peer educator program was last carried out by the Surabaya City Education Office in 2014 with representatives from each school attending. The teacher as the peer educator guide explained that at that time there was training for students as peer educators in collaboration with the Surabaya City Government.

So at the beginning, 2 or 3 years ago we had been training peer counselors by the City Government, we were still participating in the municipal government at that time, 3 years ago [...] There was training from the Surabaya City Government asking 10 students from each school and one teacher to conduct peer-counseling training, 10 of these students were trained for 3 days or more. We were trained at the municipal government, and students came home with 10 materials, there was one material drugs. [Teacher 1]

It was also stated by several teachers that the National Narcotics Agency was previously a stakeholder who provided guidance for students who were peer educators. The training lasted several days by giving some material, one of which was about preventing drug abuse.

In the past we have had the last two years of cooperation, the National Narcotics Agency is cooperating with us [...] Yes, it was peer cadres, P4GN. That was the last time the BNN had been gone for the past two years. That was even named like a group whose job is to give information to their friends what the dangers of the drug are, and what the impacts are [Teacher 2]

The supervising teacher also explained that when there had been a drug abuse case about 2 years ago, the Plato sheltered by the BNN provided rehabilitation services for students who were positive for using drugs.

After 3 months the students who had been invited to the drug seminar was the same as the BNN. They have received all certificates, the last one has been tested negatively, this one is the one that went home but the first one stayed there for 3 months, because it was too severe, going home, in the morning, he was taken by someone from the Plato, and was picked up on the afternoon [Teacher 3]

Other teachers also added that stakeholder support from Dispora (Department of Youth and Sports) was also given even though it was not directly focused on the peer educator program. The form of support provided is more about the dangers of drugs.

Yes, depending on the theme, if drugs are drugs. The dispora is often about drugs, so they bring one student who is really an addict as

a tutor, sometimes they have been invited like the Muhammadiyah teacher's faculty about the cultural empowerment [Teacher 4]

Dispora (The Department of Youth and Sports Education) was also mentioned by the teacher, who once gave activities to delegates from several schools as a form of support provided for peer tutoring.

Every school is sometimes delegated by 15 people, sometimes only 6 people depending on what activities are written later. Sometimes at SMK 5, there was a peer tutor about discipline in school [Teacher 5]

In addition, the teacher also explained that support for the prevention of the dangers of drugs had been given by the Airlangga University by involving students as extension agents for the dangers of drugs.

I was also invited in UNAIR. [Teacher 1]

Some schools also state that within one year, there are stakeholders who come for counseling, and that is not only the focus of drug problems. But there are also legal information, family planning, and so on.

NGOs were also told that they had come to several target schools to conduct counseling on the dangers of drugs, but not all schools. The NGO was delivered by the guidance teacher also in collaboration with the Faculty of Psychology of Airlangga University.

NGOs collaborate with the Faculty of Psychology of UNAIR [Teacher 1]

However, in the past few years the teacher said that support from the government and stakeholders was not as intense as it used to be. Since the program is to prevent the dangers of drugs by students has been transferred to the East Java Provincial Education Office, programs that were previously regularly monitored are no longer being carried out. This was conveyed due to several obstacles, starting from the lack of commitment from the government to the number of counseling teachers in each school, which was still very minimal to be able to monitor the running of the peer education program.

There was no trainer, but I was a coach, but also counseling teacher, SPAIN trainer, task force, and also peer counselor, [...] It should be 150 students for 1 teacher, but we have almost 400-500. [...] the task force and the counselor were not there [Teacher 3].

Constraints experienced by peer educator tutors also related to funding, support for peer educator assistance in counseling activities is rarely done because they feel that these activities now require funding.

It has been a long time ago. It was because of the cost, miss. At that time he gave it for free. Then if we ask again, we are asked for a fee. And also we are like a private school and it's a risk if we hold it like that, if the problem turns out that there really is something like that, our school will get the damage outside. Well [Teacher 6]

If the connection with the existence of funds must be paid, it must be discussed with the capability to pay first [Teacher 1]

I think it's just the funds, miss [Teacher 4]

Although the support obtained at this time is no longer incessant, the teacher stated that support from the school for the peer educator continues to be carried out, such as giving handkerchief identity to youth health cadres who later also act as peer educators.

Youth health cadres are selected 10% of the total number of students, it must be for example, if we have 1000 students, there must be 100 peer educators, it is too expensive to make vests, so we make handkerchief [Teacher 7]

Some teachers stated that support for the peer educator was by installing drug hazard posters in the school environment, in addition to including peer educators when there were invitations from outside parties and also attempting to collaborate with NGOs to provide socialization to all students, even though this activity was not focused on the peer educator.

If that is the case, like the installation of a poster is still there, if there is no direct movement [...] But to socialize about drugs we never stop here [Teacher 4]

In addition, the teacher also stated that the school cooperates with the health center to provide counseling to all students as a form of support to students, especially peer educators, so that knowledge about drug abuse increases.

Yes sometimes it is not in the program that has been submitted, so in the end we collaborate with institutions, such as directives from the Health Center, then, it is the Health Center that provides food [Teacher 5].

I don't know much, because the most frequent is from the Health Center. The Health Center has a meeting every few months, usually the target is the 10th grade, given information about drugs [Teacher 8]

## DISCUSSION AND IMPLICATION

Perception is the process of someone organizing and interpreting the impression of censorship in an effort to give something specific meaning to the environment [2].

Perception is defined as an individual process organizing and interpreting their sense impressions in order to give meaning to their environment[3].

In the context of the school, stakeholders are the ranks of government and community institutions that deal directly or indirectly with school management, have social awareness and have an influence on schools. Stakeholders are all related components that have the same rights and obligations in planning, implementing and supervising educational programs. In general the term stakeholder is defined as a stakeholder.

In implementing the peer-education program there needs to be support from various parties. The existence of social support from various parties will make the program run smoothly.

There are five types of social support including informative support, instrumental support, emotional support, social network support and reward support[4].

**a. Informative support:** The informative support provided by the stakeholders' aims to expand the peer educator's insight and understanding of the problems at hand. This information includes giving advice, instructions, suggestions, information or feedback regarding drug abuse.

The provision of information carried out continuously about drug abuse and its impact on addicts through counseling will increase the role of counseling service providers[5].

In realizing students who are clean of drug abuse, it is necessary to have continuous activities so that students, especially peer educators, in each school understand the latest issues of drug abuse.

**b. Instrumental Support:** This aspect includes the provision of facilities to facilitate or assist the peer

educator in carrying out his role. Instrumental support that can be provided in the form of supporting facilities including providing time, funds, educator educators, facilities and so forth.

The presence of instrumental support has a high influence on individuals. If individuals get that support intensively, then positively make individuals feel cared for and also valued[6].

The instrumental support provided by stakeholders such as Narcotics Agency, in the form of rehabilitation facilities for students who abuse drugs is also felt to be very helpful for the school in the handling process.

**c. Emotional Support:** Emotional support is an expression of affection, trust, attention, and feeling to be heard. Emotional support includes expressions of empathy, concern and attention to the person concerned[7].

The support given to individuals has a strong influence and becomes a separate resource that can be utilized to meet social needs while reducing perceived emotions [8].

Teacher's experience is also needed to support problem-solving strategy[9]. In this case, experience's teacher can help peer educator to do their jobs in peer education.

**d. Social Network Support:** The support of social networks will help adolescents improve performance in carrying out their roles[10].

success in a service program could only be successful if each stakeholder made an optimal contribution. In other words, the success of social capital linking lies in the awareness to show active participation and optimal contribution from each stakeholder[11].

Social network support for peer-education programs can be in the form of a gathering held with the aim of bonding between stakeholders, teachers, and peer-educators from various schools and the presence of online communication forums through groups on social media.

**e. Reward Support:** Reward support can be given through expressing positive appreciation for individuals concerned with individual ideas or feelings and positive comparison of individuals with other people.

If the award given to the individual is large, it will increase self-confidence because of the praise obtained from the results of the activities carried out by these individuals<sup>[12]</sup>.

Until now, both the school and stakeholders have never given a special award to the peer educator. This can reduce the performance of peer educators because they feel no attention is given.

Award support can actually be done by various stakeholders, through the school because the school is directly related to students. Award support can be given such as awarding a trophy or certificate for dedication from a peer educator.

### CONCLUSION

Based on the results of the study, it is known that according to the perception of the teacher, support from stakeholders is currently only limited to informative support and also instrumental support.

**Conflicts of Interest:** None declared.

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**Ethical Clearance:** Ethichs approval was received from Faculty of Ners, Universitas Airlangga with certificate number 940-KEPK.

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# Functional Analysis of Beta 2 Microglobulin Protein in Patients with Prostate Cancer Using Bioinformatics Methods

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## ABSTRACT

**Objective:** The present study aimed to use bioinformatics methods for analysis function of Beta 2 microglobulin (B2M) protein in patients with prostate cancer.

**Materials and Method:** This present study included 10 patients with prostate cancer. The human DNA was extracted and the three exons of B2M gene were amplified using three primers.

**Results:** The results revealed 24 mutations in the sequence of exon 1 and exon 2 while in exon 3 for B2M gene of patients did not determined a mutations. In exon 1, appeared a point mutation at the position 44,711,557 in more samples of patients. Also in exon 2, appeared a point mutation at the position 44,715,448 in more samples of patients, these mutations recorded in ENA, DDBJ and GenBank at NCBI databases with the number LC424499 and LC424500, respectively. The results showed using STRING program that the mutations had effect on the function of B2M protein for patients compared to B2M retrieved from NCBI.

**Conclusions:** A point mutations were determined in exon 1 or exon 2 of B2M gene at the site 44711557 or site 44715448 respectively, may be considered as the cause of prostate cancer. The mutations in B2M gene sequence affected the function of B2M protein by lost its linked with HLA-1.

**Keywords:** B2M gene, Bioinformatics Methods, Prostate Cancer, STRING program, point mutation

## INTRODUCTION

Bioinformatics is a multi-disciplinary research fields integration of among biological, computer, mathematics and statistics sciences to employ the technology that utilize computers for manipulation, distribution, retrieval and storage of information related to biological large molecules like proteins and DNA<sup>1</sup>. Beta 2 microglobulin (B2M) protein has a low molecular weight encoded by B2M gene located on the long arm of chromosome 15 at site 15q21<sup>2</sup>. Structurally, B2M protein is a light chain that binds with the polymorphic major histocompatibility complex class-1 (MHC-1) heavy chains, also known as human leukocyte antigen HLA

class 1 in human, and it is normally expressed on the cell surface as an integral part of MHC-1 and produced by all cells that contains nucleus to perform the function by presentation of peptides fragments of intracellular antigens to CD8+ cytotoxic T cells<sup>3, 4</sup>, also acts as a chaperone during the folding of MHC-1 structure<sup>5</sup>. Prostate cancer is consider the most frequently male cancer and it represents a main cause of mortality in men which related to this type of cancer<sup>6</sup>. The aim of the present study is to analyze function of B2M protein in patients with prostate cancer using bioinformatics methods.

## METHOD

The present study included ten patients with prostate cancer, their ages ranged from 60 to 77 years. During the October 2017, patient's samples chosen from Al-Amal National Hospital for Cancer Treatment in Baghdad-Iraq. Blood samples collected from each patient then stored at -20°C until the analysis<sup>7</sup>. The DNA extracted from blood using gSYNC™ DNA Extraction Kit (Cat.

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No.: GS100) Geneaid company/Taiwan according to the manufacturer's instruction. Then the extracted DNA was evaluated using agarose gel electrophoresis to confirm the presence and integrity of extracted DNA<sup>8,9</sup>.

The sequences of B2M gene were taken from the GenBank at "national center for biotechnology

information" NCBI according to the reference sequence: NC\_000015.10, where primer3 plus program was used to design three primers for three exons of B2M gene (B2M -1 primer for exon 1, B2M -2 primer for exon 2 and B2M -3 primer for exon 3) and supplied by Bioneer Corporation/Korea<sup>10</sup>. The names of primers and their sequences are shown in Table (1).

**Table 1: The primers and their sequences used for amplification three exons of B2M gene**

No. of Exon	Primer Name	Primer Sequence (Forward F/ Reverse R)	Product Size
1.	B2M-1	Forward 5'-GGC ATT CCT GAA GCT GAC A-3'	113 bp
		Reverse 5'-AGG AGA GAC TCA CGC TGG AT-3'	
2.	B2M-2	Forward 5'-TTT TCC CGA TAT TCC TCA GGT-3'	337 bp
		Reverse 5'-CAC AAC TTT CAG CAG CTT ACA AA-3'	
3.	B2M-3	Forward 5'-TTT TTC TCC ACT GTC TTT TTC AT-3'	101 bp
		Reverse 5'-TCC TCA GGA CAG TGA AAC AAA A-3'	

The polymerase chain reaction (PCR) accomplished using AccuPower<sup>®</sup> PCR PreMix kit (Bioneer Corporation/Korea) according to the manufacturer's protocol, by three primers for amplification three exons of B2M gene. The PCR reaction carried out under the conditions to amplify the target DNA as shown in Table (2). The PCR products were electrophoresed with DNA ladder 100 bp on 2% agarose gel to detect the size of amplicons, the gel was visualized by UV-transilluminator, where the amplicons were checked then photographed.

**Table 2: The PCR conditions to amplify three exons of B2M gene**

Steps of PCR	Temperature	Time	No. of Cycles
Pre-Denaturation	95°C	5 min	1
Denaturation	95°C	30 sec	30
Annealing	58°C <sup>(1)</sup> , 57°C <sup>(2)</sup> and 54.6°C <sup>(3)</sup>	45 sec	
Extension	72°C	1 min	
Final Extension	72°C	5 min	

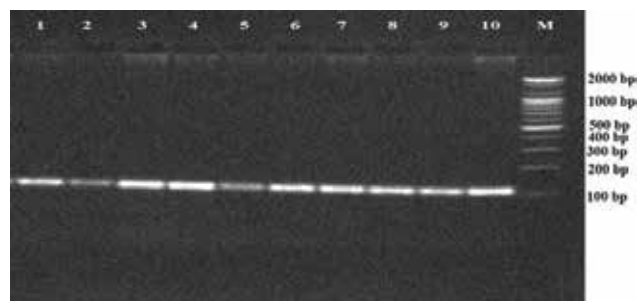
<sup>(1)</sup>Annealing temperature for B2M-1 primer: 58°C,

<sup>(2)</sup>Annealing temperature for B2M-2 primer: 57°C and <sup>(3)</sup>Annealing temperature for B2M-3 primer: 54.6°C.

Amplified PCR products sent to Macrogen Corporation/Korea for sequencing of B2M gene. Basic Local Alignment Search Tool (BLAST) program was used to compare B2M gene sequences for patients with the reference sequence of B2M gene in the GenBank at NCBI<sup>11</sup>.

Translation of B2M gene nucleotides sequence for patients to sequence of amino acids by European Molecular Biology Open Software Suite Translate nucleic acid sequences (EMBOSS Transeq) program ([https://www.ebi.ac.uk/Tools/st/emboss\\_transeq/](https://www.ebi.ac.uk/Tools/st/emboss_transeq/))<sup>12</sup>, while sequence of amino acids for B2M protein was retrieved from NCBI. Also the function of B2M protein was predicted by "Search Tool for the Retrieval of Interacting Genes/Proteins" STRING<sup>13</sup>.

**PCR Technique for Detection Three Exons of B2M Gene:** PCR technique used to amplify the sequence of exon 1, exon 2 and exon 3 of B2M gene for patients using B2M-1, B2M-2 and B2M-3 primers, respectively, the results revealed that the amplicons gave a clear bands using the electrophoresis on 2% agarose gel and it had size 113 bp for exon 1, 337 bp for exon 2 and 101 bp for exon 3 as shown in Figures (1), (2) and (3).

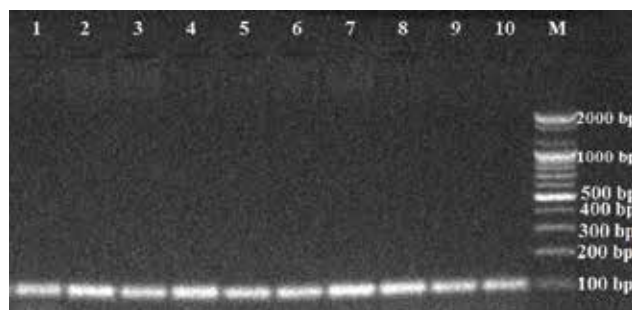


**Figure 1: The size of DNA bands (113 bp) for exon 1 of B2M gene using electrophoresis on 2% agarose gel. Lane M: DNA Ladder 100 bp. Lane (1-10): Bands of amplified region for patients**





**Figure 2: The size of DNA bands (337 bp) for exon 2 of B2M gene using electrophoresis on 2% agarose gel. Lane M: DNA Ladder 100 bp. Lane (1-10): Bands of amplified region for patients**



**Figure 3: The size of DNA bands (101 bp) for exon 3 of B2M gene using electrophoresis on 2% agarose gel. Lane M: DNA Ladder 100 bp. Lane (1-10): Bands of amplified region for patients**

## RESULTS

### Sequencing and Sequence Alignment of B2M Gene:

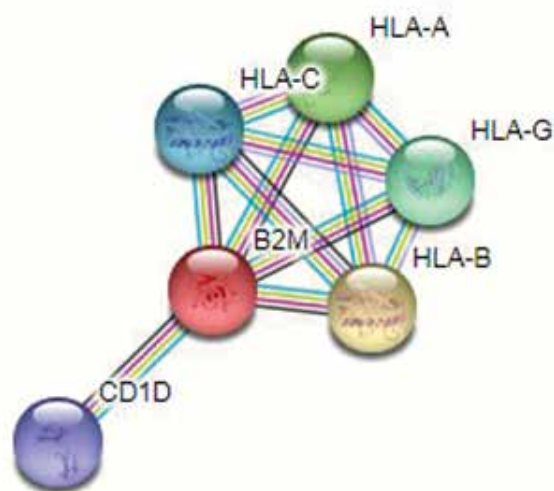
The results showed presence of 24 mutations in the sequence of exon 1 and exon 2 for all patients while in exon 3 no mutation detected. In exon 1 for all patients except (patient No.5) were detected a point mutation at the same site and it had the same impact, where the cytosine (C) was deleted from the codon which encoded for amino acid serine at the position 44711557 and affected the translation process of protein causing frameshift mutation. In addition to, a point mutation was detected at the site 44711548, where the thymine (T) was deleted from the codon which encoded for amino acid methionine causing frameshift mutation in patient No.1. Also a point mutation was detected in the sequence of exon 1 in patient No.5, where the thymine (T) was inserted between the site 44711549 and site 44711550 causing frameshift mutation.

Also in exon 2 for all patients except (patient No.2 and No.6) were determined a point mutation at the same site and it had the same impact, where the adenine (A)

was deleted from the codon which encoded for amino acid serine at the position 44715448 and affected the translation process of protein causing frameshift mutation. In addition to, a point mutation was detected at the site 44715448, where the adenine (A) was replaced with the guanine (G) for the codon which encoded for amino acid serine causing silent mutation in patient No.2 and No.6. Also the cytosine (C) was replaced with the guanine (G) for the codon which encoded for amino acid tyrosine causing nonsense mutation in patient No.2. Additionally, double substitution were determined in the same codon for the amino acid histidine, where the cytosine (C) replaced with the guanine (G) at site 44715452, and the thymine (T) replaced with the guanine (G) at the site 44715454 causing missense mutation in patient No.6.

## FUNCTION ANALYSIS

Results of STRING program showed that B2M, is component of MHC-I, involved in the presentation of peptide antigens to the immune system. Additionally, B2M binds with other proteins such as MHC-1 to perform its function in (patient No.1 and No.5) and B2M retrieved from NCBI, this means that mutations did not affect B2M function for these samples of patients as shown in Figure (4). While in other patients (patient number 2, 3, 4, 6, 7, 8, 9 and 10), B2M had lost its bound with HLA-1, this means that mutations affected the B2M thus loss its.



**Figure 4: The network interaction of B2M protein (red color node) with other proteins such as (HLA) for patients with prostate cancer (patient No. 1 and No. 5) and B2M retrieved from NCBI predicted by STRING program**

## DISCUSSION

In the sequences of exon 1 or exon 2 of B2M gene appeared to have a point mutation at the position 44,711,557 or at position 44,715,448, respectively in more samples of patients, this indicates a relationship between these mutations in nucleotide sequence of B2M gene of patients and cancer. Therefore, these mutations can be consider as a possible cause of prostate cancer. These results were compatible with Myerowitz study which revealed that Tay–Sachs disease caused by “genetic mutation” in the HEXA gene <sup>14</sup>. Also in agreement with Scriver study which revealed that Phenylketonuria was caused by a point mutations in the PAH gene <sup>15</sup>.

The mutations in the sequence of B2M gene for patients had a significant effect on the function of B2M protein led to non-binding of B2M protein with HLA-1 heavy chain to form (B2M/ HLA-1 complex), hence, the function of this complex fails to introduce foreign antigens to the CD8<sup>+</sup> T cells by formation (B2M/ HLA-1/ foreign antigen complex), also it fails to stimulate the immune system (CD8<sup>+</sup> T cells) to eliminate the mutated cell, which may be a cancerous cell, which lead to the division of this cell randomly without the actual function and in large numbers it's difficult to be eliminated by the immune system by CD8<sup>+</sup> T cells, leading to the development of cancer. The results are in agreement with the Del Campo et al study demonstrating that mutations in B2M gene sequences led to B2M protein inability to form a functional complex with HLA-1 heavy chain <sup>16</sup>. Also the results are in agreement with the Bernal et al study <sup>17</sup> demonstrating that B2M is the light chain and an essential constant component of MHC-1, this (B2M/ MHC-1 complex) presenting endogenous protein antigens on the surface cell, which allows CD8<sup>+</sup> T cells to recognize and respond to the foreign antigen repertoire of hazardous cells, including tumor cells. In addition B2M protein deficiency because of a mutations in B2M gene sequence may be sufficient to generate tumor cell precommitted to escape from immunological surveillance.

## CONCLUSIONS

The mutations in exon 1 at the position 44,711,557 and exon 2 at position 44,715,448 for B2M gene were determined to be related with prostate cancer. The mutations in B2M gene sequence of patients influenced the function of B2M protein by absent it's linked with HLA-1 heavy chain as compared with B2M retrieved from NCBI.

**Conflict of Interest:** None

**Ethical Clearance:** Informed written consent was obtained from all the participants in the study, and the study and all its procedure were done in accordance with the Helsinki Declaration of 1975, as revised in 2000. The study was approved by Al-Amal National Hospital.

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# Use of Bipolar Cautery in Thyroidectomy

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## ABSTRACT

**Introduction:** Thyroidectomy has most performed surgeries all through the world, which has a low morbidity rate.

**Aim:** To study the impact of bipolar burning amid thyroid surgery with respect to the duration of surgery and blood misfortune at the time of surgery.

**Material and Method:** In this investigation, 50 patients with thyroid swelling who underwent outpatient surgery from 2013 to 2017 were enrolled. The thyroid surgeries were finished using bipolar cautery and its outcomes were investigated.

**Results:** The majority of patients were 30-40 years of age. Surgery time ranged from 50 minutes to 135 minutes. The more drawn-out surgery times, contrasted with different examinations, were attributed to the learning curve associated with this new procedure. The blood loss ranged from 25-50ml. Complication rates were less with bipolar thyroidectomy such as postoperative discharge (2%), transitory recurrent laryngeal nerve paralysis (2%), a minor level of wound contamination (2%) and signs of hypocalcemia (6%). The mean term of stay in the healing facility was four days. The cost of the bipolar burning is less in comparison with symphonious surgical blade and LigaSure. Also, post-agent complications are less with bipolar cautery.

**Conclusion:** The bipolar cautery method was found to be effective then other thyroidectomy methods.

**Keywords:** *Thyroidectomy, bipolar burning, bipolar cautery, thyroid illnesses*

## INTRODUCTION

Thyroidectomy is a normal surgery performed, as a rule, in the surgery division. It is a standout amongst the most generally performed surgeries all through the world, which has much to do with its low mortality rate. Presently, with the appearance of more up-to-date procedures, the length and intricacy of the surgery have diminished. Commonly, thyroidectomy surgery was finished by a suture hitch-tying system, which can diminish recuperation and build wound disease, causing damage to neighboring structures and outer body reactions. Thyroidectomy utilizing bipolar cautery is sutureless and less tedious; additionally,

blood misfortune amid surgery is insignificant<sup>1</sup>. Wound-mending is better and the post-agent intricacies are less with thyroidectomy done by bipolar cautery.

Bipolar burning has advantages over monopolar cautery because it doesn't influence the neighboring tissues. In a bipolar cautery, tissues stick to the anode tip; this is because of movement of contrarily charged erythrocytes to the positive shaft amid coagulation. The odds of harming the tip are greater because of rehashed cleaning to expel the roasted particles in the tip<sup>2</sup>. The power expected to coagulate a surface point relies upon the impedance of the circuit (the burning tip to a ground plate in monopolar and, in bipolar, from one cautery tip to the next). This impedance relies on numerous elements; the essential components are the separation between the two anodes and the conductance of the tissue.

The adequacy of bipolar cautery is expanded when joined with a saline water system for coagulation of tissues. In a few papers, isotonic mannitol was utilized for water system reasons in the midst of the operation.

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King and Worpole<sup>3</sup> clarified that the water system consequently flooded bipolar cautery. Dujovny et al.<sup>4</sup> created a model utilizing bipolar forceps with an inbuilt suction channel, as well as a flooding pump with a self-outlined system coupled with the cautery unit, to provide a water system to the forceps' tip.

The first thyroid surgery was performed in the twelfth century; it was related to high mortality and dismalness, in light of which it was not routinely performed<sup>1</sup>. With the utilization of general anesthesia and antiseptics, death rates decreased to 8% by the nineteenth century<sup>5</sup>. With the coming of new advances like LigaSure, the symphonious surgical blade, and bipolar surgical diathermy, the rate of morbidity and complications have diminished. Numerous examinations have been performed looking at ligature and suture hitch-tying or consonant surgical tools with traditional bunch-tying<sup>6</sup>. In this investigation, the researchers picked the utilization of bipolar electrocautery for performing thyroid surgeries - that is, a sutureless thyroidectomy. The water system, coupled with the bipolar cautery gadgets, is expensive; they are accessible only in exceptionally prepared doctors' facilities.

Thyroidectomy activities were finished by specialists of differing types and levels of training and in various clinical practice settings. Contrasts exist in light of cutting-edge preparation, knowledge, caseload, and work in the setting. The goal of this study was to think about the impact of bipolar burning amid thyroid surgery with respect to the duration of surgery (in minutes) and blood misfortune at the time of surgery (no of gauze used).

## MATERIALS AND METHOD

This clinical observational investigation was held with 50 patients experiencing thyroidectomy in Tikrit city, from 2013 to 2017. This investigation was directed over a period of seven months.

**Consideration Criteria:** Patients with favorable, harmful thyroid illnesses were chosen after analgesic fitness. Patients of both genders, aged 18 years and older, were selected. Oral consent was taken from the patients before enrolled in the present study.

## RESULTS

**Age and gender distribution of patients:** During this investigation, the majority of patients were 30–40 years

of age, with 41–50 years representing the next largest group. In two cases where the patients over 60 years. The mean age for thyroid infections is 41–50 years. Of the 50 patients examined, 48 were female, and two patients were male. The male-to-female ratio was 1:25. Thyroid issues are more typical in females.

**Surgery Type:** Of the aggregate 50 patients examined, 13 patients with single nodular goiter (SNG) experienced hemithyroidectomy, and 37 patients experienced aggregate thyroidectomy; of those, 30 patients had multinodular goiters and seven patients had Hashimoto's thyroiditis. Surgery was performed in euthyroid patients (86%) and on hypo/hyperthyroid patients subsequent to making them euthyroid with drugs (14%).

**Duration:** Of the 13 hemithyroidectomies with bipolar surgical burning, in eight patients the length of surgery time was 45-60 minutes (n=8), in one patient, the term of surgery was 30-35 minutes, and in four patients, the span of surgery was 60–75 minutes. Hence, the mean span of surgery was 45-57 minutes. Of the aggregate 13 hemithyroidectomies, three were finished by postgraduates, eight were finished by collaborators, and two were finished by the chief of surgery. The researchers have utilized bipolar diathermy for as long as two years, and the more drawn-out surgery times are attributed to the learning curve of doctors new to the procedure.

Of the 37 patients who experienced thyroidectomy with bipolar surgical burning, the aggregate time length differed from 50 minutes to 135 minutes. The variation in the surgery time is given in the Table 1. The mean length for thyroidectomy was 82.5-97.5 minutes. Of 37 thyroidectomies, 10 were done by postgraduates in 120–135 minutes, 20 were done by colleagues in 105-120, and seven were done by the chief of surgery in 60-75 minutes.

Of the 50 patients studied, 43 patients presented with the euthyroid state, six patients presented with hypothyroid, and one patient presented with the hyperthyroid state. In the aggregate, 13 patients experienced a hemithyroidectomy surgery length of 45–60 minutes.

**Table 1: The variation in the surgery time of enrolled patients**

Sr. No.	Number of patients	Surgery time length (minutes)
1.	13	75–90
2.	2	120–135
3.	2	45–60
4.	2	60–75
5.	10	90–105
6.	21	105–120

**Blood loss:** For the 13 patients who experienced hemithyroidectomy, the blood loss differed from 20–40 ml. In five patients, the blood misfortune amid surgery was 25 ml (n=5); in one patient, it was 40 ml; another one lost 35 ml; two patients lost 30 ml; and four patients had 20 ml of blood misfortune. Mean blood misfortune in hemithyroidectomy patients was 30 ml. Of the 37 patients who experienced aggregate thyroidectomy, the blood misfortune ranged from 25–50 ml. Of those, 10 patients had 30 ml of blood misfortune, in three patients it was 25 ml, and it was 50 ml in another three patients.

Of the 50 patients who experienced thyroidectomy, one experienced unnecessary postoperative injury soakage (2%). It was minor and did not require re-investigation, and the patient recuperated with preservationist treatment. One patient experienced impermanent RLN paralysis (2%); that subject recuperated completely after a month and a half. Three patients (6%) showed signs and manifestations of hypocalcemia, which also diminished with intravenous calcium gluconate and oral calcium.

The length of stay in the doctor's facility for 30 patients was three days, five patients stayed for two days, six patients for four days, six patients for five days, and three patients stayed for six days. The mean length of stay at the healing facility was four days.

## DISCUSSION

Thyroidectomy is a common surgical methodology worldwide, yet at the same time it is a test for specialists. The task isn't just troublesome, it is incredibly intricate. This operation is very difficult to perform, but it carries high morbidity if complications are not considered.

This examination reports the utilization of bipolar surgical burning for thyroidectomy, which makes

the simple activity with fewer complexities and, furthermore, lessens the span of surgery. Manouras et al.<sup>5</sup> found that, in contrast to the exemplary method, surgical time was diminished altogether by around 20% when the bipolar/vessel sealer was utilized. The more drawn-out term of surgery in this study, in addition to comparing different examinations, is credited to the learning curve of utilizing this new procedure. The researchers began utilizing bipolar diathermy in 2013. In their examinations they have found that the mean working time for hemithyroidectomy and aggregate thyroidectomy is 45–57 minutes working in a team and 82.5–97.5 minutes individually. Govindaraj et al.<sup>7</sup> showed that the average working time for lobectomy was 20 minutes, 45 minutes for thyroidectomy, and 180 minutes for thyroidectomy with neck analyzation.

Sandonato et al.<sup>8</sup> tested the utilization of electrothermal cautery in thyroid surgery, assessing its viability in hemostasis and its ability to diminish post-agent entanglements like hypoparathyroidism and intermittent laryngeal nerve palsy. Bipolar burning decreases the blood misfortune in the surgical field, making the surgical field clearer, thus the working specialist can improve the situation better than with the regular bunch-tying strategy. Govindaraj et al.<sup>7</sup> indicated a complication rate of 10.18%, in which 1.85% of complications were because of surgical site contaminations, 1.85% were because of one-sided intermittent laryngeal nerve injuries, and 3.7% were because of hypoparathyroidism (75% transient, 25% perpetual). Challa and Surapaneni<sup>9</sup> found that, out of 40 patients who experienced sutureless thyroidectomy, none had any essential, auxiliary/reactionary hemorrhage. One patient experienced an aggregate thyroidectomy for follicular carcinoma-created transient hypocalcemia. Bove et al.<sup>1</sup> demonstrated the frequency of transient hypocalcemia to be 24.5%. In this investigation, of 50 patients who experienced a thyroidectomy, six patients experienced complications (12%): one patient had postoperative injury soakage (2%), one experienced voice change (2%), one had a persistent seroma (2%), and three patients had side effects indicative of hypocalcemia (6%).

An analysis by Challa and Surapaneni<sup>9</sup> demonstrated that bipolar surgical diathermy for thyroidectomy is better than LigaSure and symphonious surgical tools, which are expensive and accessible primarily in private, high-tech surgery centers.

## CONCLUSION

Thyroidectomy utilizing bipolar burning is a protective and powerful technique and is less tedious. Bipolar burning is accessible in government-funded hospitals. Thyroidectomy utilizing bipolar cautery is less tedious and the blood misfortune at the time of surgery is less than with the standard knot-tying method. Also, post-agent entanglements are less with bipolar cautery. The gear utilized for monopolar cautery supports bipolar diathermy with no alterations. There is no danger of burn injury, not at all like monopolar diathermy. It is safe to use close to imperative structures. Just the tissue held in the middle of the two appendages is seared. Bipolar cautery is utilized with a saline water system to avoid singing and, along these lines, to expand viability and productivity. Bipolar cautery is a safe, successful, and accessible strategy that can bring down surgery costs. It delivers less complications than traditional techniques.

**Ethical Clearance:** The ethical clearance was taken from College of Medicine, Tikrit University, Tikrit Iraq. Oral consent was taken before enrolled the patients in the study.

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**Conflict of Interest:** Nil

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# Analysis of Occupational and Non-Occupational Fatigue Risk Factors among Commercial Pilots in PT XYZ, Jakarta

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## ABSTRACT

Potential accidents and health problems related to fatigue remain a tremendous problem in commercial flight. This study was conducted to investigate fatigue risk factors among pilots in PT XYZ. There were 196 participants in the study. In order to gather more information, a questionnaire was administered, and a systematic in-depth interview was performed on each pilot individually. The Samn-Perelli Subjective Scale, designed specifically to measure fatigue, was used, and the measurements were analysed using regression and correlation analysis. Of the participants, 60.5% frequently experienced post-flight fatigue. Measurement of fatigue levels showed that 26 participants (13%) experienced physical fatigue, 61 participants (30.5%) experienced mental fatigue and 47 participants (23.5%) experienced emotional fatigue. Occupational and non-occupational factors played a substantial role in the occurrence of fatigue. Of the various risk factors (such as quality of sleep, quantity of sleep and working hours), the number of flight sectors showed a positive correlation with fatigue. In contrast, smoking habits, exercise, caffeine consumption, flight duration and napping showed negative correlations with fatigue. To reduce the occurrence of fatigue, the current established programmes at PT XYZ (which include limitations on flight time and working hours, and provision of resting time) should be continued.

**Keywords:** *fatigue, pilot, commercial flight, occupational and non-occupational factors*

## INTRODUCTION

Nowadays, the issue of fatigue is a significant concern in commercial flight. Fatigue is defined as an acute or chronic condition of tiredness that leads to mental or physical exhaustion and limits a worker's ability to work under normal conditions<sup>1</sup>. Some researchers have demonstrated that occupational factors contribute to fatigue-related incidents in commercial flight. Scheduled night flights and prolonged flight times affect fatigue and contribute directly to accidents and health problem among pilots. Empirical analysis of aviation studies shows a correlation between work schedules and accidents on commercial flights<sup>2</sup>.

A study conducted by Neville et al.<sup>3</sup> on army aviation crew members during Operation Desert Storm showed that pilots who experienced extended work periods, night shifts, reduced sleep and circadian dysrhythmia due to crossing time zones were prone to improper decision-making. Under short-haul conditions, long working hours and a higher number of flight sectors were common among pilots and contributed significantly to fatigue<sup>4</sup>. According to the Civil Aviation Authority<sup>5</sup>, Britain's pilots experience fatigue initiated by the length of time and the number of sectors during shift work in short-haul conditions.

In order to overcome excessive working hours, Indonesia has stated in Civil Aviation Safety Regulation No. 121 that the standard flight duty time for pilots in commercial airlines is 14 hours in any consecutive 24 hours. Long flight duration has a significant correlation with fatigue because it is associated with undesirable environmental conditions, such as limited workspace, limited air flow, poor illumination level, noise and vibration<sup>6</sup>.

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In addition to the aforementioned factors, non-occupational factors play an important role in fatigue. In terms of quantity of sleep, eight hours is the average time required by a person to obtain normal vigilance levels during the daytime without drowsiness<sup>7</sup>. Poor quality of sleep is a considerable indicator of sleep disturbance and medical problems<sup>8</sup> and has a direct association with death<sup>9</sup>.

Other factors contribute to the quantity of sleep, as studied by Wetter and Young<sup>10</sup> in their cohort research, where male and female smokers were more likely to experience sleep disturbance and non-restorative sleep than non-smokers. Caffeine consumption also affected cognitive performance by reducing sleep time<sup>11</sup>. In contrast, napping for about ten minutes was found to improve wakefulness for the following 155 minutes and was the most effective way to reduce fatigue<sup>12</sup>. Another study stated that a short rest period of about fifteen minutes per hour resulted in decreased levels of drowsiness and undesirable sleep<sup>13</sup>. The present study is intended to scrutinise occupational and non-occupational factors that contribute to fatigue in pilots in commercial flight so that companies can set up priority programmes for reducing fatigue among their pilots.

**METHODS**

The study involved 196 participants and used a hypothesis-testing design<sup>26</sup>. Self-administered questionnaires and in-depth interviews were used to gather information about occupational and non-occupational factors among the pilots. Specifically, the Samn-Perelli Subjective Fatigue Check Card was used to determine the degree of fatigue, the Epworth Sleepiness Scale (ESS) was used to measure the level of drowsiness, and the Pittsburgh Sleep Quality Index (PSQI) was used to determine the quality of sleep in a recent month. The data was then analysed to determine the frequency and distribution of fatigue among the pilots. Further analysis used regression and correlation analysis tests to identify correlations between fatigue and its contributing factors.

**RESULTS**

As presented in Table 1, non-occupational factors, including quantity and quality of sleep, showed a positive correlation with the occurrence of fatigue. In line with the results of other studies, it was found that poor quality and quantity of sleep led people to experience fatigue more frequently than people who had better quality and quantity of sleep. As shown in Table 2, occupational factors, such as flight sectors and working hours, demonstrated a similar correlation: having long working hours and more flight sectors made participants more likely to experience fatigue. However, flight time and several personal habit factors (such as smoking habits, exercise, caffeine consumption and napping) showed a negative correlation. These findings will be explored further in the discussion section.

**Table 1: Correlation and Regression Analysis of Non-Occupational Fatigue Factors in PT XYZ Jakarta**

Parameter	Fatigue		Correlation	Regression
	Yes	No		
<b>Quality of Sleep</b>				
Poor	56.2%	40.5%	0.153	Y = 0.53 + 0.15X
Good	43.8%	59.5%		
<b>Quantity of Sleep</b>				
<8 hours	66.9%	50.6%	0.054	Y = 0.545 + 0.071X
≥8 hours	33.1%	49.4%		
<b>Smoking Habit</b>				
No	74.4%	67.1%	-0.079	Y = 0.629 + (-0.086)X
Yes	25.6%	32.9%		
<b>Caffeine Consumption</b>				
No	74.4%	67.1%	-0.079	Y = 0.629 + (-0.086)X
Yes	25.6%	32.9%		
<b>Exercise</b>				
No	56.2%	62%	-0.058	Y = 0.639 + (-0.057)X
Yes	43.8%	38%		
<b>Napping</b>				
No	87.6%	91.1%	-0.055	Y = 0.681 + (-0.086)X
Yes	12.4%	8.9%		

**Table 2: Correlation and Regression Analysis of Occupational Fatigue Factors in PT XYZ Jakarta**

Parameter	Fatigue	Average Time (hour/week)	Standard Deviation	Correlation	Regression
Working Hours	No	40	22.717	0.053	Y = 0.558 + 0.003X
	Yes	37.1	17.527		
Flight Sectors	≥2	33.1%	17.7%	0.169	Y = 0.554 + 0.186X
	<2	71.9%	82.3%		

In addition to the data shown in Table 1, the results of the study also demonstrated that as many as 26 participants (13%) experienced physical fatigue, 61 participants (30.5%) experienced mental fatigue, and 47 participants (23.5%) experienced emotional fatigue. The majority of participants (as many as 60.5%) frequently experienced post-flight fatigue. This study, however, focuses on the correlation and regression analysis for occupational and non-occupational fatigue-related factors.

## DISCUSSION

It is widely recognised that poor quantity and quality of sleep affects people's ability to recover from fatigue. Table 1 shows that as many as 66.9% of the pilots had experienced fatigue due to lack of sleep, leading to an accumulation of sleep debt. Recovery from fatigue can be achieved in the first six hours of sleep, whereas sleeping for more than six hours increases sensitivity, energy and brain capacity for dealing with normal situations in the long term<sup>14</sup>. Nine hours of sleep are required to enable a high level of vigilance<sup>15</sup>.

Of the participants in the present study, 56.2% had experienced fatigue due to the poor quality of sleep. It has already been demonstrated that mental and physical fatigue are caused by poor quality of sleep<sup>16</sup> and are associated with an increase in stress in the workplace<sup>17</sup>. Inability to recover from fatigue may lead to a detrimental cycle, in which an accumulation of fatigue results in a greater need for recovery after working time<sup>18</sup>. This study highlights the fact that recovery from fatigue can be attained by balancing adequate sleep time with good quality of sleep.

This study demonstrates that long working hours are positively associated with fatigue in pilots. This is in line with a study conducted by Goode<sup>2</sup>, which found that long working hours have a significant association with fatigue. Factors such as long working hours, early start times, long-time completion of duty and one-night deadlines led to an accumulation of fatigue and caused people to have anomalous sleep patterns. In addition, working for 10–12 hours makes the relative risk of accident 1.7 times greater; working for 13 hours makes it 5.5 times greater<sup>19</sup>.

Working hours and flight sectors have a close association with fatigue. Of the respondents in the present study, 74.1% who operated more than two sectors

experienced fatigue more frequently than those who operated one or two sectors. An increase of flight sectors from one to four sectors is equivalent to an increase in working time of about 2.77 hours<sup>20</sup>. Another association is related to the availability of time for sleep. Operating excessive flight sectors causes longer working hours, which in turn reduces the amount of time available for sleep. At this point, adequate dedicated time for sleeping is still an important factor in recuperating from fatigue.

In contrast, personal habits such as exercise, smoking habits, caffeine consumption and napping presented different correlations from the previous factors. Exercise is capable of reducing sleep disturbance by releasing tension and contributing to a decrease in body temperature<sup>21</sup>. However, the present study found that pilots still had inadequate time and bad quality of sleep, which makes it more difficult to recover from fatigue. Hence, when the pilots exercised, they were already in a fatigued state. A similar explanation applies to napping and caffeine consumption. Napping affects an individual's vigilance and performance<sup>22</sup>, while caffeine improves performance by decreasing sleeping time<sup>23</sup> and by acting as a mood booster<sup>24</sup>. However, the effects are only short-term and insufficient to prevent the occurrence of fatigue.

In terms of smoking habits, the results showed that non-smokers experienced fatigue more regularly than smokers. It is already recognised that smoking habits influence fatigue indirectly by reducing the quality and quantity of sleep<sup>25</sup>, factors that are known to contribute to fatigue. However, the sample in this study might be not representative of the wider population, because the majority of respondents were non-smokers. Thus, even though the respondents did not smoke, they already experienced fatigue due to other factors.

As for flight duration, there was a negative correlation with the occurrence of fatigue. In 2012, Indonesia established in Civil Aviation Safety Regulation No. 121 that two pilots are allowed to fly a flight for nine hours or less within a 24-hour period and must not exceed 30 hours in seven consecutive days. The present study shows that the flight duration (hours per week) that contributed to fatigue or not fatigue (see Table 1) did not exceed the threshold limits established in the regulation. This meant that, even though the pilots had shorter flight durations, they were already in a state of fatigue.

## CONCLUSION

This study concludes that occupational and non-occupational factors affect the occurrence of fatigue among pilots in commercial flight. Balancing adequate sleep and proper quality of sleep helps pilots to recuperate from the fatigue that they might experience in the workplace. In addition, limitations on working hours and flight sectors also benefit pilots by preventing fatigue in the workplace. Aligning all the contributing factors to prevent fatigue is an appropriate element in planning and a suitable way forward to reduce health problems and accidents related to fatigue. The current Fatigue Program at PT XYZ, with its limitations on flight time and working hours and the provision of resting time in the workplace, should be continued.

**Conflict of Interest:** Hereby the authors declared that there is no conflict of interest in this research with any other parties.

**Ethical Clearance:** This research has been approved by Ethical Board Committee, Faculty of Public Health University Indonesia and has been approved for ethical clearance by Ethical Board Committee, Faculty of Public Health University Indonesia.

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# Correlation between Serology and Molecular Diagnostic Tests for HCV in Children Receiving Blood or Blood Products Experience of Single Institute, Wasit Province-Iraq 2016

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## ABSTRACT

Studies about transfusion transmitted HCV infections are limited and very important to make insight about this burden health problem which are the main route of transmission for HCV in the developing countries and to improve blood banks practices for blood donations by implementation of maximally sensitive screen for HCV.

**Patients and Methods:** A cross sectional study done at the hemato-oncology center in Al-Karama Teaching Hospital, Wasit-Iraq. The patients included have different Hemato-oncological diseases over a period from the 1st of January 2016 to the 31st of May 2016.

The patients were classified according to age, sex, disease and number of blood or blood products transfusion. HCV serological screen done by specific enzyme immunoassays (EIA) antibody detection and by Molecular Nucleic Acid Amplification Technique (NAT) viral load in Al-Karama Teaching Hospital Lab.

**Results:** 59 patients included in this study. 61% of them was male, 50% of them were below 10 years of age. Leukemia, hemophilia and Von Willebrand diseases constitute around 70 % of the studied patients. About 70% of the patients were received more than 25 time as blood or blood products before time of investigation.

13 (22%) of the studied patient were positive for HCV by serology and 17 (28.8%) of them were positive for HCV by molecular viral load.

From the 13 patients with Serologically positive test, two of them were negative in molecular viral load study. While the serological study was negative in 40 patients, six of them were positive in viral load study. Seventeen patients were diagnosis to have hepatitis C virus by viral load study, eleven of them were serologically positive. This difference was statistically significant with P value 0.0001.

**Conclusion:** The methods of blood screen in Iraq, as other developing countries still mainly depend on serology which not enough to give safe blood. There are urgent needs to adapt increasingly sensitive serology with introduction of Molecular Nucleic Acid Amplification Technology (NAT) side to side in blood donations screen.

**Keywords:** hepatitis, viral load. Blood transfusion

## INTRODUCTION

Globally, HCV has an estimated prevalence of 2.5%,<sup>(1)</sup> with ~170 million people are chronically infected with the hepatitis C virus, with 3 to 4 million new infections per year and over 350,000 deaths due to hepatitis C virus (HCV)-related liver disease each year.<sup>(1,2)</sup>

The long-term impact of HCV infection is highly variable, ranging from minimal effects to chronic hepatitis, advanced fibrosis, cirrhosis, and hepatocellular carcinoma.<sup>(1,3)</sup> Transfusion transmission of HCV is still a significant route of infection in the developing world.<sup>(4)</sup>

In 1989 HCV discovered and in 1990 the implementation of HCV antibody screening greatly participates in the prevention of transfusion-transmitted HCV.<sup>(4,5)</sup>

Although the serological tests were able to reduce the number of cases of Transfusion Transmitted HCV, the window period from viremia before seroconversion and detection of anti-HCV antibodies even with more advances serological assays (third-generation specific enzyme-immunoassays, EIA) remained around 7-8 weeks, but also may be delayed to 13 weeks (90 days).<sup>(4)</sup> This long window period prior to detection of anti-HCV antibodies was an impetus to adopt nucleic acid amplification technology (NAT) assays for screening donors that made the residual infectious window period less than 3 days.<sup>(7,8)</sup> NAT technology assays adapted by blood banks in U.S as routine blood screen for HCV in 1999.<sup>(6)</sup>

As of 2010, 33 countries in the world reported that they had introduced NAT for HCV testing.<sup>(4)</sup>

In almost all cases, serological assays are performed in parallel to NAT testing that allows discernment of the “stage” of HCV infected donors as: acute (RNA-positive/Ab-negative), chronic (RNA-positive/Ab-positive) or presumptive resolved (RNA-negative/Ab-positive) infections.<sup>(4,9)</sup>

In Iraq blood screening done by serological test only through specific enzyme-immunoassays (EIA) for detection of anti-HCV antibody.

Thousands of patients with different hematological diseases such thalassemia's, hemophilia's, malignancies such as leukemias...etc. still greatly exposed to the of transfusion transmitted infection of HCV because we still depend on anti-body screen in blood banks.<sup>(10-12)</sup>

## PATIENTS AND METHOD

A cross sectional study of the medical records of 59 patients, who have hemato oncology diseases in hematology center in AlKarama teaching hospital in the city of AlKut, the state of Wasit, Iraq. Over a period from the 1st of January 2016 to the 31st of May 2016.

All those patients with history of blood or blood products transfusion

The medical records of the patients were retrospectively reviewed from the department of statistics and the records that are present in the consultant clinic for specific demographic, diagnostic and therapeutic information. A comprehensive chart review was performed to determine the age, gender, clinical diagnosis, and the result of investigations.

The patients were classified according to age, sex, disease and number of blood or blood products transfusion

HCV serological screen done by specific enzyme immunoassays (EIA) and by Molecular Nucliec Acid Amplification Technique (NAT) viral load in Al-Karama Teaching Hospital, wasit-Iraq.

Patient data were tabulated and processed using SPSS (Statistical Package for the Social Sciences 20) for windows. Qualitative data are expressed as frequency and percentage, Data are presented as mean  $\pm$  SD and range for quantitative variables.

## RESULTS

From 59 patients whom enrolled in the study, the male was 36 (61%) of the total patients, and female 23 (39%). Half of the patients were less than 10 years of age. Leukemia was the majority of case where 18 patients were known case of leukemia, followed by 12 patients with hemophilia and 10 patients have Von Willebrand disease. Nine patients have thalassemia and three cases were spherocytosis and thrombasthenia. One case was reported as Wilms tumor, pure red cell aplasia, MDS and immune thrombocytopenia purpura. About 70% of the patients were received more than 25 time as blood or blood products before time of investigation.

Thirty-three patients were managed by blood transfusion only while others were treated by blood or blood products such as cryoprecipitate or platelet or others blood products.

Table No. one shows the demographic data of the patients.

**Table 1: Demographic data of the patients**

Item	No	Frequency
<b>Sex</b>		
Male	36	61
Female	23	39
<b>Age</b>		
< 10 years	30	50.8
$\geq$ 10 years	29	49.2
<b>Disease</b>		
Leukemia	18	30.5
Hemophilia	12	20.1

Conted...

Von Willebrand disease	10	16.9
Thalassemia	9	15.3
Thrombasthenia	3	5.1
Spherocytosis	3	5.1
Others	4	7
<b>No. of pints received</b>		
<25	18	30.5
≥25	41	69.5
<b>Type of recipient</b>		
Blood	33	55.9
Blood product	26	44.1

The mean of patients age was 11.4 year (1-33 years), the mean TSB was 1.1 mg/dl, but many patients have high level of bilirubin as highest level was 21 mg/dl. Liver enzymes were variable as ALT mean level was 54 IU/L and mean of AST was 45.5 IU/L, ALP mean level was 204 IU/L.

Regarding viral load results was for Hepatitis C was 1949836.475 copies/ml. laboratory finding of the patients is shows in table No. two.

**Table 2: Laboratory finding of the patients**

Item	Mean	St. Deviation	Range
Age (years)	11.4	0.68	1-33
<b>Liver function test</b>			
TSB (mg/dl)	1.17	0.37	0.1-21
ALT (IU/L)	54.4	0.8	14-556
AST(IU/L)	45.5	0.5	17-247
ALP(IU/L)	204	1.2	87-523
Hepatitis C viral load copies/ml	1949836.475	9092405.504	0-56900000

Table number three shows the patients whom had C viral infection according to type of tests, as serological study for hepatitis C virus study was reported positive in 13 patients (22%) respectively. While viral load for virus type C was reported in 17 (28.8%) patients.

**Table 3: Number of infected patients with hepatitis C according to type of test**

Item	No.	Percent
Serological hepatitis C infection	13	22
Viral load of hepatitis C detection	17	28.8

Correlation between serological test and viral load for C viral shows in table No. four. Serological test was reported 13 patients, two of them were negative in viral load study. While serological study was negative in 40 patients, six of them were positive in viral load study. Seventeen patients were diagnosis to have hepatitis C virus by viral load study, eleven of them were serologically positive. This difference was statistically significant with P value 0.0001.

**Table 4: Correlation between serological test and viral load test for hepatitis C infection**

Type of test		C virus load yes or no		Total	P value
		Not infected (%)	Infected (%)		
Serological test	Not infected (%)	40 (67.8)	6(10.2)	46(78)	0.0001
	Infected (%)	2(3.4)	11(18.6)	13(22)	
Total		42(71.2)	17(28.8)	59(100)	

Table number five shows the correlation between type of blood product or number of transfusions with infection.

For hepatitis C infection, thirteen patients from seventeen positive patients were received more than 25 pints, with no statistical significance ( p value 0.5). Nine patients from seventeen positive patients were received blood rather than blood product. With no statistical significance (p value 0.7).

**Table 5: Correlation between number of transfusion and type of transfusion and Hepatitis C infection**

Item	Viral load positive	Viral load negative	P value
<b>Hepatitis C virus</b>			
More than 25 pint	13	28	0.5
Blood	9	24	0.7

## DISCUSSION

The available studies about HCV prevalence and risk factors in the developing countries is still vague.<sup>(13,14)</sup>

In our study there were no significant effect of age, sex, diagnosis, level of liver enzymes and number of blood or blood product transfusion.

There was significant difference between the result of serology and Molecular Nucliec Acid Amplification assays by viral load for HCV.

The presence of HCV RNA in the peripheral blood is a reliable marker for HCV replication and is the main marker used to confirm active infection.<sup>(15)</sup>

HCV positive anti-bodies was reported in 13 (22%) of the studied patients. While the result of molecular NAT was positive in 17 (28.8%) of the same studied patients.

The correlation between the result of serology and Molecular NAT (viral load) was significant, two patients with positive serology were negative in viral load study which probably means presumptive resolved HCV infection.

Approximately 15 % to 30% of patients spontaneously clear HCV within 6 to 12 months of initial exposure. Such individuals remain anti-HCV antibody positive, but have no detectable viremia, without long term sequel.<sup>(15)</sup>

Six from forty patients with negative serology were positive in NAT (p value 0.0001)

Theses finding can be explained as either these patients had acute HCV infection and they are in the window period of HCV infection or the initial serological test was incorrect or improper techniques.

The same happened when 17 patients with positive NAT, eleven only were positive in serology (p value

0.0001) and this means either these patients had acute infection in the window period of serology or the antibody screening results are incorrect.

There are urgent needs to better understand HCV prevalence and incidence in Iraq to help in decrease transmission from preventable causes, and especially through blood and blood product donations.

Blood and other parenteral exposures in health care settings are still the major routes for HCV transmission in the developing countries compared to the rest of the world where the major route of transmission is currently Intravenous Drug User (IDU).<sup>(4)</sup>

Based on WHO studies, blood banks in developing countries depend on EIA assays are unable to perform similar sensitivity to EIA assays in the developed countries, because blood banks in developing countries are poorly regulated and lacks systems to assure that standardized testing is performed.<sup>(10)</sup>

The addition of NAT assays in developed countries effectively reduced the Transfusion Transmitted HCV infection should encourage the developing countries to do the similar strategies that will reduce the long window period before EIA assays reactivity. The main problem of molecular NAT assays is the technical training and reagents costs.<sup>(4)</sup>

Currently in USA the incidence of transfusion transmitted HCV is very low around one in million (0.0001%) per unit transfused and so in most of the developed countries.<sup>(4)</sup>

In a study for American Red Cross in USA to evaluate the benefit of NAT on prevalence of HCV during the period 1999 to 2008, Reveal over 300.000 HCV antibodies positive blood units before donation, 244 were NAT positive before seroconversion.<sup>(11,12)</sup>

The finding of our study should focus attention to physician practicing in Iraq, that serological test for viral infection evaluation especially for patients whom received blood or blood product may not reflect the real infection state of the patients.

In our country there are thousands of human beings suffering from many inherited and non-inherited diseases, such as thalassemia, leukemia and bleeding tendency. They are exposed for frequent blood or blood product transfusions and facing a great risk to be infected by serious life-threatening infection from blood or blood products.



We are, as a part of the developing countries we are in urgent needs to develop an effective blood bank practices with continual screening to give safe blood as a part of individual rights by serological assays and Molecular Nucleic Acid Amplification Technique (NAT).

The Government of Iraq, represented by the Prime Minister and health authority should pay a great and real attention for this burden health problem, through maintaining high standards for blood screening and adapt several viruses analysis by using Molecular Nucleic Acid Amplification for HBV and HIV and HCV viruses in blood and blood product screen.

### CONCLUSION

The message to Iraqi doctors, Keep the indications of blood or blood product transfusions limited to strong scientific base and by specialized team to decrease the risk of transfusion transmitted diseases including HCV, HBV, and HIV.

Larger studies are needed to evaluate the real burden risk of transfusion –transmitted infections to treat them early to decrease possible complications and to know the subtypes distribution of HCV infection and the response to treatment.

**Ethical Clearance:** Thesis is done by supervision of ethical committee of faculty of medicine of Wasit University.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# The Effect of Extension Methods on Knowledge and Attitude of Young Women about “Sadari” at Immim High School of Pangkep District

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## ABSTRACT

This study aims to determine the effect of counseling methods on the knowledge and attitudes of young women about breast self-check (*Periksa Payudara Sendiri = SADARI*) at IMMIM High School of Pangkep Regency. This study used a quasi-experimental design with a case control approach. Respondents in this study were 74 young women. The sample was divided into two, namely 37 people in the experimental group and 37 people in the control group. Based on the results of the study, it can be concluded that there is an increase in knowledge in the experimental and control groups. The pretest results in both groups showed an increase of 94.6% in the experimental group and 97.3% in the control group, with a sig value. 0.00. While the attitude has also increased 70.3% in the experimental group and 67.6% in the control group with sig. 0.203 and 0.626. There was an increase in attitude, but it was not significant. This is based on the attitude of young women who know about SADARI procedures but still lack the practice because they have no time and are considered complicated.

**Keywords:** SADARI, extension, youth, knowledge, attitude

## INTRODUCTION

About 8.2 million people die from cancer. According to WHO in the Ministry of Health of the Republic of Indonesia <sup>1</sup> states that, 12% of all deaths in the world are caused by cancer and are number 2 killers after cardiovascular disease. Cancer can attack all groups of people without exception and without recognizing social status, age and gender. Children, adolescents and adults do not escape this deadly attack but women are most affected by cancer <sup>2-4</sup>.

Indonesia as one of the countries in Asia is also not immune from this disease. Breast cancer is a cancer with the highest prevalence in Indonesia in 2013, breast cancer by 0.5% with a total of 61,682 breast cancer sufferers and this number is predicted to continue to increase. This increase in cases also occurred in South Sulawesi and Pangkep District where this study was conducted. Indonesian teenagers are currently experiencing rapid social change from traditional societies towards modern society, which also changes their norms, values and lifestyles <sup>5</sup>.

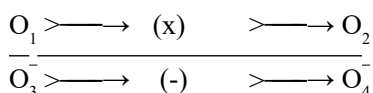
There are still a few case discoveries in the early stages causing early detection and screening efforts to be very important. The low awareness of self-examination does not only occur in women with low education and economics, but also occurs in women who are highly educated and well-established. The exact cause of breast cancer is unknown. However, a number of factors can be triggers, including an unhealthy lifestyle, such as consuming foods rich in fat, carbohydrates, and low in fiber, as well as smoking habits and lack of exercise. By doing SADARI, the rate of death from breast cancer can be reduced by up to 20%, but there are still many women do not understand what SADARI is <sup>6</sup>.

This study aims to determine the effect of counseling on whatsapp's method of using social media to increase the knowledge and attitudes of young women regarding SADARI.

## MATERIALS AND METHOD

This study uses experimental research methods, which aim to find out a symptom or effect that arises as a result of certain treatments.

The design of this study can be described as follows:



**Keterangan:**

X : Exsperiment (Extension via whatsapp)

- : Control (Extension with lecture)

O<sub>1</sub> and O<sub>3</sub>: Pre-test scores (before intervention)

O<sub>2</sub> and O<sub>4</sub>: Post-test (after intervention)

The study population was young women with samples divided into 2 groups: the intervention group and the control group with 37 people each. The intervention group was given counseling treatment through the whatsapp method while the control group was given counseling through the lecture method.

Data collection is done through interview techniques with structured questionnaire instruments. Data analysis used the independent sample t-test to determine the average differences between the two groups of unrelated samples. If the two groups of samples have further differences, it will be known that the sample group has a higher average value.

**RESULTS**

**Table 1: Distribution Analysis Based on the Characteristics of Young Women in the Control and Intervention Group**

Intervention Group	n	%	Control Group	n	%
<b>Age (years)</b>			<b>Age (years)</b>		
16	4	10.8	15	4	10.8
17	32	86.5	16	30	81.1
18	1	2.7	17	3	8.1
<b>Classes</b>			<b>Classes</b>		
XXI IPA (Natural Sciences)	23	62.2	XXI IPA	25	67.6
XXI IPS (Social Sciences)	14	37.8	XXI IPS	12	32.4
Total	37	100	Total	37	100

Source: Primary Data, 2017

Table 1 shows that the proportion of young women based on the highest age was in the intervention group, namely young women aged 17 years (86.5%) and the lowest among 18-year-old adolescents (2.7%). The proportion of adolescent girls based on class in the highest intervention group was in class XXI IPA (62.2%) and lowest XXI IPS (37.8%). The proportion of young women based on age was highest in the control group, namely girls aged 16 years (81.1%) and the lowest was adolescents aged 17 years (8.1%). The proportion of adolescent girls based on class in the highest intervention group was in class XXI IPA (67.6%) and the lowest was XXI IPS (27.0%).

**Table 2: Average Analysis of Pre-test and Post-Test Scores in Intervention and Control Groups**

Scores	Min	Max	Mean ± SD
<b>Intervention Group</b>			
Pre-test Knowledge	33	80	56.31 ± 11.75
Post-test Knowledge	67	87	80.18 ± 4.71

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Pre-test Attitude	30	79	60.61 ± 10.62
Post-test Attitude	58	73	63.68 ± 3.52
<b>Control Group</b>			
Pretest Knowledge	40	73	58.38 ± 9.25
Posttest Knowledge	63	93	84.41 ± 6.34
Pretest Attitude	25	78	61.11 ± 12.50
Posttest Attitude	55	73	63.04 ± 4.04

Source: Primary Data, 2017.

Table 2 shows that the mean knowledge score in the highest intervention group was in the post-test with a mean of 80.18 and standard deviation of 4.71. The highest attitudinal score in the intervention group was in the post-test with a mean value of 63.68 with a standard deviation of 3.52. Thus, all variable scores in the intervention group experienced a mean increase from pre-test to post-test. The highest knowledge score in the control group was in the post-test with a mean of 84.41 with a standard deviation of 6.34. The highest attitudinal

score in the control group is in the post-test with a mean value of 63.04 with a standard deviation of 4.04. Thus, all variable scores in the control group experienced an increase in the average from the pre-test to the post-test.

**Table 3: Analysis of Distribution of Status of Respondents Based on Knowledge and Attitudes of Intervention Groups**

Variable	Intervention				Control			
	Pre-test		Post-test		Pre-test		Post-test	
	n	%	n	%	n	%	n	%
<b>Knowledge</b>								
High	6	16.2	35	94.6	6	16.2	36	97.3
Low	31	83.8	2	5.4	31	83.8	1	2.7
<b>Attitude</b>								
Good	23	62.2	26	70.3	21	56.8	25	67.6
Not Good	14	37.8	11	29.7	16	43.2	12	32.4
Total	37	100.0	37	100.0	37	100.0	37	100.0

Source: Primary Data, 2017

Table 3 shows that the pre-test distribution of respondents 'knowledge in the highest intervention group was in the low category by 31 (83.8%), while the post-test distribution of respondents' knowledge in the highest intervention group was in the high category of 35 (94.6 %). The distribution of respondents' pre-test attitudes in the highest intervention group was in the good category, 23 (62.2%), while the post-test distribution of the attitudes of the respondents in the highest intervention group was 26 (70.3%). The

distribution of pre-test knowledge of the respondents in the highest control group was in the low category of 31 (83.8%), while the post-test distribution of knowledge of the respondents in the highest control group was in the high category of 36 (97.3%). The distribution of the pre-test attitudes of the respondents in the highest control group was in the good category by 21 (56.8%), while the post-test distribution of the attitudes of the respondents in the highest control group was in the good category of 25 (67.6%).

**Table 4: Analysis of Changes in Pre-test/Post-test Knowledge and Attitudes In the Control Group and Intervention Group Using the Wilcoxon Test**

Variable	Intervention		P	Control		P
	n	%		n	%	
<b>Knowledge</b>						
Decline	0	0	0.000	0	0	0.000
Increase	36	90		37	100	
Stay	1	10		0	0	
<b>Attitude</b>						
Decline	15	39	0.203	17	35	0.626
Increase	21	51		17	35	
Stay	1	10		3	30	
Total	37	100		37	100	

Source: Primary Data, 2017

Table 4 shows that the analysis of changes in knowledge of pre-test/post-test in the highest intervention group was respondents who experienced an increase of 36 respondents with sig. 0,000. It means

that there is an influence of knowledge on the provision of health education using social media (WhatsApp) at Putri Pangkep IMMIM High School. Changes in pre-test/post-test knowledge in the highest control group

were respondents who experienced an increase of 37 respondents with sig. 0,000. This means that there is an influence of knowledge on the provision of health education using the lecture method at Putri Pangkep IMMIM High School.

Changes in the pre-test/post-test attitude in the highest intervention group were respondents who experienced an increase of 21 respondents with a sig

value. 0.203. This means that there is no influence of attitudes towards the provision of health education using social media (WhatsApp) at Putri Pangkep IMMIM High School, while the change in pre-test/post-test attitude in the highest control group is respondents who experienced an increase of 17 respondents with sig. 0.626. This means that there is no influence on attitudes towards the provision of health education using the lecture method at Putri IMMIM High School in Pangkep.

**Table 5: Analysis of Knowledge and Attitudes Differences in Intervention Groups and Control Groups Using the Mann Whitney Test**

	Groups	N	Mean Ranks	Sig.
Pre-test Knowledge	Intervention	37	35.16	0.347
	Control	37	39.84	
Post-test Knowledge	Intervention	37	28.62	0.000
	Control	37	46.38	
Pre-test Attitude	Intervention	37	36.54	0.701
	Control	37	38.46	
Post-test Attitude	Intervention	37	38.82	0.593
	Control	37	36.18	

**Source:** Primary Data, 2017

Analysis of differences in pre-test about knowledge shows a value of 0.347. This means that there is no significant difference in the score of the knowledge pre-test between the intervention group and the control group, while the analysis of the difference in post-test knowledge shows a significant value of 0,000. This means that there are significant differences in the scores of knowledge post-test scores between the intervention group and the control group.

Analysis of the difference in attitude pre-test shows a value of 0.701, while the analysis of differences in post-test attitudes in the intervention and control groups with a significant value of 0.593.

## DISCUSSION

**The influence of counseling by methods (whatsapp and lecture) on increasing the knowledge of young women:** The results showed the distribution of the level of knowledge of respondents before being given health education. The low level of knowledge of respondents is related to the absence of the habit of respondents seeking information about health, especially about SADARI. Some respondents did not know what SADARI meant, which was an early detection of breast cancer.

In addition, there has never been any health education specifically regarding SADARI at the IMMIM High School in Pangkep Regency. The school has also never collaborated in delivering health information with the relevant agencies.

The results of the study using the Wilcoxon Test obtained the results of analysis with sig values. 0,000 which means that there is a difference in the level of knowledge before and after giving health education about SADARI, for the experimental group (whatsapp) and the control group (lecture). Increased knowledge because counseling in this study is supported by counseling material which is a student's need. Innovative delivery methods using the WhatsApp and lecture methods with question and answer sessions. Through a method like this, it can develop two-way communication between those who provide counseling with the target of counseling and it is expected that the level of understanding of students towards the material delivered will be clearer and easier to understand.

**The effect of counseling by methods (whatsapp and lecture) on increasing attitudes of young women:** Attitudes are divided into two categories, namely good and not good. After being given health counseling, there

was a change in attitude for the experimental group, but the change in attitude that occurred did not experience significant changes.

Personal experience is one of the factors that influence a person's attitude. Theory states that in order to be the basis of attitude formation, personal experience must leave a strong impression. Mass media also influences a person's attitude because the news that is supposed to be factually conveyed objectively tends to be influenced by the attitude of the author, consequently it will affect the attitude of the consumer. Besides the factors of personal experience and mass media, there is a stage of motivation that changes a person after attending health education to truly change daily behavior.

**The effect of counseling by methods (whatsapp and lecture) on the knowledge and attitudes of young women:** The results of this study showed that there were no significant differences in the score of the pre-test knowledge between the intervention group and the control group while the analysis of differences in post-test knowledge in the intervention and control groups with a significant value of 0,000. It means that there was a significant difference in the value of the post-test score of knowledge between the intervention group and the control group.

The results of this study are not in accordance with the theory which states that attitudes based on knowledge will be more lasting than attitudes that are not based on knowledge. In addition, changes in attitude are carried out through health education so as to instill knowledge in the hope that it will shape attitudes that will influence behavior (Picket and George, 2008). This is due to other factors that can influence a behavior including knowledge, beliefs, attitudes, resources <sup>7</sup>.

The behavior of a person or community about health is determined by the knowledge, attitudes, and beliefs, traditions, and so on of the person or community concerned <sup>8,9</sup>. In addition, the availability of facilities, attitudes, and behavior of health workers on health will also support and strengthen the formation of behavior. Knowledge or cognitive is a very important domain in shaping one's actions. The formation of new behaviors especially for adults is preceded by the existence of knowledge and then becomes an attitude that finally materializes into a behavior both positive and negative behavior.

Sufficient or high knowledge without sufficient or high motivation, so that a positive or positive attitude will not be formed which will then manifest in behavior. In addition to motivational factors, there are also many other factors that can affect a person's behavior, in this case, SADARI behavior, which is lazy, does not have time because of a lot of busyness, forgetting, feeling no complaints, fear of detecting breast cancer. It is even more ironic that SADARI is not important to do because many other jobs are more important.

## CONCLUSIONS AND RECOMMENDATIONS

1. There is an extension effect on increasing the knowledge of young women, before and after being counseling for the experimental group using the Whatsapp method, while the lecture method is given to the control group has increased from 83.8% to 97.3%.
2. There is an influence of counseling on increasing attitudes in both groups
3. There is an influence of counseling (whatsapp and lecture) on increasing knowledge so that young women understand more about SADARI but for attitude, the increase obtained is not significant.

This study suggests that the school can do a form of counseling as a more innovative health promotion media. The school can include SADARI material on the subject of education.

**Conflict of Interest:** Nil

**External Funding:** Nil

**Ethical Clearance:** Taken from the School of Public Health, Universitas Pejuang RI, Makassar, Indonesia

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# Understanding the Delayed Factors for Reducing Maternal and Neonatal Mortality in Indonesia: Based on the 2015 Inter-Censal Population Survey and the 2014 Village Potential Statistics

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## ABSTRACT

**Background:** Maternal and neonatal mortality in Indonesia are still high compared to countries with the same economic level. The cause of death of both the most common causes were delayed getting medical services. This study aims to understanding the delayed factors to reducing maternal and neonatal mortality in Indonesia.

**Method:** Data were derived from two cross-sectional studies, the 2015 Intercensal Population Survey (SUPAS) and the 2014 Village Potential Statistics. The study population was women of reproductive age (15-49 years) who lived in the households located within the 40,750 census blocks of the 2015 SUPAS. There were 652,000 households. Information of all maternal and neonatal deaths (singleton live births) that occurred between 2010 and 2015. The unit analysis was a census block, and each census block consisted of 16 households. The analysis used equalized block census level of socio-economic and health program factors on the natural log of unadjusted measures of maternal and neonatal mortality.

**Results:** Risk of mortality were women of low education (lower than secondary high school), poor household, longer average distance to hospital, a large number of traditional birth attendants and residing in out Jawa Bali, Use of contraceptives, delivery attended by trained health workers are significantly associated with lower maternal and neonatal mortality.

**Conclusion:** socio-economic and geographic differentials contribute to delayed of health services and causes high maternal and neonatal mortality in Indonesia.

**Keywords:** *maternal mortality, neonatal mortality, determinant social, geographic factor, delays factor*

## INTRODUCTION

Maternal and neonatal mortality in Indonesia are still high compared to countries with the same economic level. It will be detrimental, because the country will lose a group that is still productive and who will build the nation. Moreover, maternal mortality is also a tragic event for families, because the loss of family members who love and care for their families. In developing countries, maternal deaths are almost certain that deaths

occur in their babies<sup>(1)</sup>. Actually, maternal and neonatal deaths can be prevented.

The results of the evaluation of the MDGs in 2015, the maternal mortality rate is quite far from the target of 305 per 100,000 than it should have been at 102 per 100,000 <sup>(2)</sup>. Target SDGs (Sustainable Development Goals), maternal mortality less than 70 per 100,000 live births in 2030 <sup>(3)</sup>. To achieve this target, annual maternal mortality is required at 9.5% while the trend of decreasing maternal mortality in Indonesia is 5% per year<sup>(4)</sup>.

The neonatal mortality rate in Indonesia is also still high<sup>(5)</sup>. Another problem, the estimated neonatal mortality rate is 19 per 1000 live births, but the decline has stagnated in the past nine years, from 20/1000 in 2003

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and only decreased to 19/1000 in 2012 <sup>(2)</sup>. Other studies have shown an increasing trend <sup>(6)</sup>. Needs understanding to reducing maternal dan neonatal mortality.

Maternal deaths occur because of the delay in receiving adequate health services. The theory of Thaddeus and Deborah Maine mentions the delays are caused by socioeconomic/cultural factors, accessibility of facilities and quality of care <sup>(7)</sup>. Indonesia, the fourth most populous country in the world, consists of approximately 17,000 islands, and 4,918 sub districts, and 70,460 villages <sup>(8)</sup>, so this geographic factor can be an obstacle to access health services.

The background of these, this study aims to understanding the delays factors to reducing maternal and neonatal mortality in Indonesia. Delay in accessing services through geographic analysis: urban rural residential, Java Bali and Outer Java Bali, average distance to health facilities, health workers. Delay due to socio-economic factors: poorest kuintil and low education. Delay due to quality care : ratio of hospitals, health centers, phycsician, midwives and exposure to health programs: childbirth by health workers and use of contraception.

This study used two cross-sectional studies, the 2015 Intercensal Population Survey (SUPAS) and the 2014 Village Potential Statistics/PODES. Information of all maternal and neonatal deaths (singleton live births) that occurred between 2010 and 2015. Analysis is carried out using census blocks as an analysis unit. This method is never done in SUPAS 2015 and PODES 2014.

## METHOD

This study uses the two surveys data files, the 2015 Intercensal Population Survey (SUPAS) and the 2014 Village Potential Statistics (PODES), were merged to obtain the needed variables. The SUPAS data covered the national fertility and mortality indicators such as crude death rates, maternal mortality rates, infant mortality, and under-five mortality<sup>(9)</sup>.

Total samples included all 40,750 census block, each block consisted of 16 households, making a total of 652,000 households. A cut-off sampling procedure was used to obtain a representative population, using 'take all and take some' assumptions (Glaser 1962). The population was first partitioned in two strata: household

strata with death cases and household strata without any death. Among the strata with death cases (or n1), 'take all' was applied when there were 1-8 households and 'take some' was applied when there were more than 8 households. However, there were no census blocks that have more than 8 households in strata with death cases. Among the strata without death (n2), 'take some' was applied, so that the sample size is  $n_2 = n - n_1$  (where  $n=16$  households) <sup>(9)</sup>.

Birth and death histories between 2010 and 2015 were obtained, and the adequacy of sample size was calculated based on maternal deaths during pregnancy, delivery and post-partum at the 2010 census, hoping that the result would be accurate at regional and national levels. Data on the barriers in accessing health services, were derived from the 2014 Village Potential Statistics (PODES), since the Central Agency for Statistics (BPS) included information on village's facilities and infrastructures as well as economic, social, cultural and other conditions in PODES <sup>(10)</sup>.

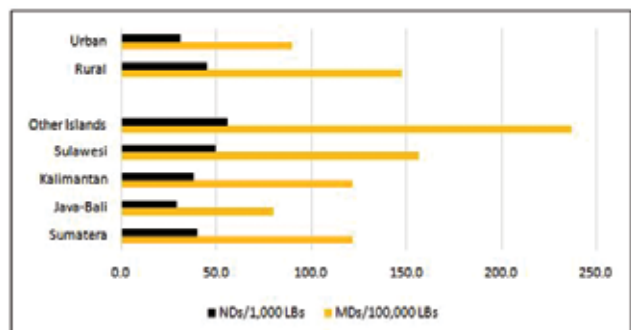
Variables outcome are unadjusted maternal mortality(number of maternal death per 1000 live births) and unadjusted neonatal mortality rate (number of neonatal death per 1000 live births). Variables covariat are place of residence in urban rural, in Jawa Bali or out Jawa Bali. Variable independen include age of mother, parity, poor household, women using contraceptive, delivery by health worker, ratio hospital, ratio health center, ratio physician' practice, ratio midwives' practice, number traditional birth attendants, average distance to hospital, and average distance to health center.

Statistical analysis based on the valid data obtained, we performed a descriptive analysis of both the independent and dependent variables of interest by using centralisation and dispersion measures. The normality of the quantitative variables was verified using the Kolmogorov-Smirnov test. In order to reach normality, log transformation was used for the non normal variables. All hypothesis testing to determine differences, associations and relationships was deemed significant at  $p < 0.05$ . Statistical data analyses were performed using the STATA version 14.0.

## FINDING

The results of the analysis show there is a mortality gap according to the region. Sumatra and Java Bali Region is located in the western region of Indonesia.

NTB, NTT, Maluku and Papua are regions that are located in eastern Indonesia. NTB, NTT, Maluku and Papua regions have the highest ratio of maternal and neonatal deaths compared to other regions (figure 1).



**Figure 1: Unadjusted Maternal and Neonatal Mortality by Region and Urban Rural, 2010-2015**

Source: analysis of Supas data

Note: These numbers and statistics are unadjusted not for citation for MMR (Maternal Mortality Ratio and Neonatal Mortality Rate)

The results (Table 1) show differences in mortality according to socio-economic factors, and exposure to health programs and availability of facilities and health workers. Socio-economic factors are explained through the level of low-educated mothers and the level of well-being measured by quintiles 1 and 2.

**Table 1: Characteristic of Undjusted Maternal and Neonatal Mortality**

Characteristic	Unadjusted Maternal and Neonatal Mortality*
<b>Proportion of women with lower education</b>	
Low	37.29
High	54.83
<b>Proportion of poor households</b>	
Low	35.32
High	56.93
<b>Proportion of women using contraceptive</b>	
Low	50.19
High	43.44
<b>Delivery by health workers</b>	
Low	61.5
High	38.45

Conted...

<b>Ratio hospital per 1000 population in a district</b>	
Low	44.16
High	35.27
<b>Ratio health center per 1000 population in a district</b>	
Low	40.75
High	52.34
<b>Ratio practice-physician per population in a sub-district</b>	
Low	52.75
High	40.25
<b>Ratio practice-midwife per 1000 population in a subdistrict</b>	
Low	43.5
High	35.53
<b>Ratio traditional birth attendant per 1000 population in a village</b>	
Low	38.69
High	53.94
Total	46.79

Source: analysis of Supas data

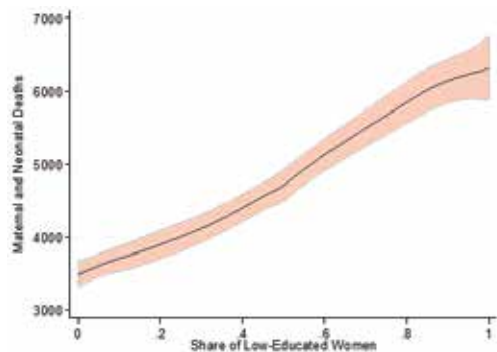
\*Note: These numbers and statistics are unadjusted not for citation for Maternal Mortality Ratio or Neonatal Mortality Rate.

Mothers who are low educated tend to lack knowledge about diseases and nutrients needed during pregnancy. Mothers also don't understand the importance of antenatal care so they don't get information on symptoms and danger signs that can occur during pregnancy or childbirth. Ignorance of the dangers and symptoms of this complication causes late deciding to seek medical services which can lead to death. IDHS 2012, show that low-educated mothers have a low level of antenatal care and delivery in health facilities, so that causes the mother to be less informed about the dangers and implications of pregnancy<sup>(11)</sup>. Other studies that also show low education and poorest levels have high maternal or neonatal mortality<sup>(12),(13),(14),(15),(16),(17)</sup>.

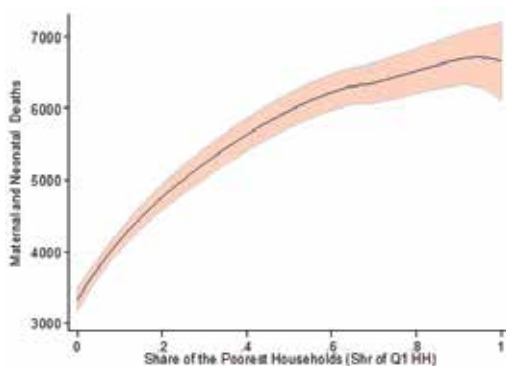
The meaning, to prevent delays, the community that has many low educated women and poorly must to get intervention/health program exposure. In communities that have a lot of traditional birth attendants, maternal and neonatal mortality was higher. The presence of traditional birth attendants suspect delays in accessing the modern services. This means that the government must be intensive to promoting to use services in health facilities.

Further analysis shows there is a correlation between the higher of maternal and neonatal mortality

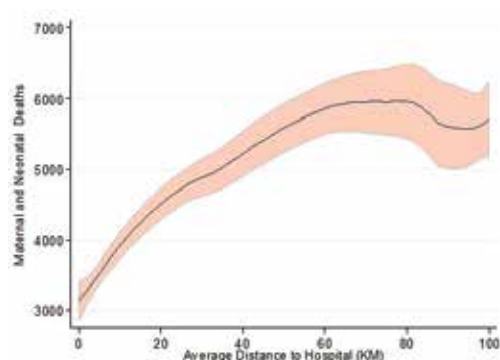
with the higher of poor and low educated mothers (Figure 2, Figure 3). The farther away from the hospital, the maternal and neonatal mortality is higher (Figure 4). This eviden gives an understanding: referral system must be easy to accessible and provide the ability for poor mothers to be able to get the opportunity to obtain quality services.



**Figure 2: Maternal & Neonatal Mortality by Low Educated Women**



**Figure 3: Maternal & Neonatal Mortality by Poor Household**



**Figure 4: Maternal & Neonatal Mortality by Average Distance to Hospital**

The results (Table 2), Socio-economics is an underlying factor and multidimensional. Overall, poverty, low education and rural are interrelated. Poverty is an obstacle in accessing better education. These obstacles occur because to get a better education requires higher costs. The risk of low-educated women is having less knowledge in maintaining pregnancy, both knowledge of the disease and the intake / nutrition needed during pregnancy. Diseases during pregnancy or nutrition that are not optimal can interfere with the growth and development of the fetus. As a result the fetus can be stillborn, low birth weight, or preterm birth. These are all major risk factors for neonatal death <sup>(13)</sup> <sup>(18)</sup> <sup>(19)</sup> <sup>(20)</sup>,<sup>(21)</sup>,<sup>(22)</sup>,<sup>(23)</sup>.

**Tables 2: Determinan of Maternal and Neonatal Mortality, 2010-2015**

Maternal and Neonatal Mortality	Coefficient	P value	[95% CI)	
High share of low-educated women	0.3303582	0,000	0.2449854	0.4157311
High share of poor households	0.1731712	0.001	0.0721394	0.2742029
High share of women used contraceptives	-0.0879624	0.028	-0.1666142	-0.0093106
High-density hospitals per 1000 pop in district	-0.0654879	0.125	-0.1492413	0.0182654
High-density health center per 1000 population	0.0116431	0.792	-0.0749312	0.0982174
High-density of practice physician per 1000 population	0.0244147	0.604	-0.0679055	0.1167348
High share of practice midwife per 1000 population	-0.1020309	0.013	-0.1829248	-0.021137
High share of delivery by health worker	-0.9355149	0,000	-1.031558	-0.8394713
High number traditional birth attendants per 1000 pop	0.0893283	0.044	0.0025398	0.1761167
Average Distance to Hospital	0.0020786	0.019	0.0003432	0.0038141
Average Distance to Health Center	-0.0027171	0.175	-0.0066458	0.0012115
Urban	0.0567581	0.295	-0.0495084	0.1630247
Jawa Bali	-0.712754	0,000	-0.8060269	-0.6194812
constant	2.659951	0,00	2.486883	2.83302

Morbidity and mortality will burden and drain a country's economy. So it is important to do preventive efforts. Minimize risk through prevention of maternal morbidity that will reduce neonatal mortality. The results of this analysis indicate that the poor, and low-educated woman population groups are vulnerable groups. A good health system must be able to guarantee the availability of facilities, personnel, health information in the vulnerable groups.

In addition to minimizing risk factors, improvements in facility services are also needed. Strategies for facilities services at the global level in reducing neonatal deaths due to small infants and having infections through corticosteroid use, resuscitation, Kangaroo mother care, neonatal sepsis management. We recommend that these services be an indicator of quality services at facilities in Indonesia.

### CONCLUSIONS

Socio-economic and geographic differentials contribute to delayed of health services and causes high maternal and neonatal mortality in Indonesia. To prevent delays requires more intervention in the risk groups: women of low education, poor, living in rural areas, outside Java Bali. The use of contraception, childbirth by health workers, improve the effective referrals system by nearest hospital that is capable of emergency services will decrease maternal and neonatal mortality. It is important to promote the use of modern facilities in the regions which have number traditional birth attendants is high.

Conflict of Interest: The authors declare that they have no competing interests.

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**Ethical Clearance:** This research has received ethical approval from the University of Indonesia and for the use of secondary data used ( No.letter of ethical approval : 223/H2.F10/PPM.00.02/2018) and permission from National Institution of Health Research and Development, Ministry of Health of Republic Indonesia.

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# Study of Hematological Changes in the Experimentally Infected Sheep with Ticks *Hyalomma spp.*

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## ABSTRACT

This study was aimed to find out the variables in some blood parameters. A series of experiments were conducted for evaluation the changes in some blood parameters of 16 of female's sheep that divided into two groups. First group included 8 animals that infected with *Hyalomma spp* ticks & the another group included 8 of non- infected animals that represent control group. The results of the total counts of red blood and the measurement of hemoglobin counts showed no significant differences between the two groups. Also, there is no signs of any type of anemia were observed in the experimental animals. In conclusion, no significant changes in blood parameters of tick-infected animals. The absence of any type of anemia in animals infected with ticks. We observed high percentages of Eosinophils and Basophils in tick-infected animals.

**Keywords:** Hematological Changes, Sheep, Ticks, *Hyalomma spp.*

## INTRODUCTION

Ticks are important external parasites that cause large economic losses in herds when they release the saliva in the infected body. This is because they contain immunosuppressive materials and then they absorb a quantity blood from the infected body<sup>1</sup>. *Hyalomma anatolicum* is a type of hard tick that affects some farm animals and transmit the pathogens that it may carry, such as parasitic protozoa, viruses, bacteria and Rectasia<sup>2,3,4,5</sup>. *Hyalomma anatolicum* is the dominant and most common of other species of *Hyalomma species* in Iraq<sup>6,7</sup> and it is the main carrier of the parasite *Theileria hirci*<sup>8</sup> which causes the Yellow fever in Iraq that affects humans and domestic animals<sup>9</sup>.

The researchers confirmed that tick-infected animals may be resistant to subsequent infection due to predisposition to certain antigens or previous predisposition to ticks<sup>10,11,12</sup>. The acquisition of infected ticks or resistance depends on several factors that may be due to the added immune factors<sup>13</sup>.

The increase in the cost of some anti-ticks and the development of tick resistance has made it difficult to control the ticks and diseases transmitted in the fields, prompting researchers and scientists to look for alternatives to control them. They also confirmed the possibility that protein extracts may play an active role in immunization and inducing body's resistance against some ticks<sup>14</sup>.

The current study aimed on studying and evaluating the changes in some blood indices in sheep infected with ticks.

## MATERIALS AND METHOD

**Experimental animals:** In the current study, two groups of female congenital sheep were selected with similar ages in the reconstruction. The first group included 8 animals belonging to one of the breeders and were infected with ticks (*Hyalomma spp*), which was diagnosed in laboratory and was filled with blood.

The second group also included 8 animals selected from one of the farmer fields in Karbala governorate and treated with insecticides, which did not notice any sign of tick injury and was selected as a control group to compare with the infected group above.

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**Blood tests:** Blood was drawn from all experimental animals for one time under the same conditions, where 2 ml of blood was drawn from every animal and placed in a tube containing the anticoagulant (EDTA) to study the changes in blood indices. Using glass slides with blood samples and dyeing them with Giemsa stain. The performed tests in relation to blood by using<sup>16,17</sup> methods to study the hematological traits.

**Statistical Analysis:** All the results of the study were subjected to statistical analysis and the differences were compared between statistical means using the statistical program SAS<sup>18</sup> and Duncan polynomials test to infer the least significant difference at 0.01 and 0.05.

## RESULTS

**Total number of red blood cells (TRBCs):** There was no significant difference in the occurrence of red blood cells in experimental animal groups during the study period. They were  $9.46 \pm 0.31$ ,  $9.14 \pm 0.13$  cell/ml<sup>3</sup> blood for both infected groups and the control group respectively. There was no statistically significant difference between the studied groups  $p > 0.05$ .

**Total number of white blood cells (TWBCs):** White blood cells increased in the animals of the infected group compared to the animals of control group which were not infected with ticks. The average values of the animals in the two groups had  $8.65 \pm 0.55$  cells/ml<sup>3</sup> in the infected group. While it was  $5.88 \pm 0.48$  cells/ml<sup>3</sup> of blood was in the control group with differences between the two groups.

**Table 1: Variables of the total count of white blood cells in experimental animals (number  $\times 10^3$  cells/mm<sup>3</sup> blood)**

No.	Groups	Value (cell/ml <sup>3</sup> blood)
1.	Infected with ticks	$8.65 \pm 0.55$
2.	Control group (non-infected)	$5.88 \pm 0.48$

$\pm$  standard error

p-Value= ( $p > 0.01$ ,  $p > 0.05$ )

## Differential count of white blood cells (Diff.WBC)

**Neutrophils (N%):** The percentage of neutrophil cells in the infected group decreased to  $40.1\% \pm 4.84$  compared to the non-infected animals group, which had a ratio of  $47\% \pm 1.41$ . No significant statistical difference was observed between the two groups ( $p > 0.05$ ), Table (2).

**Lymphocytes (L%):** There was a slight decrease in the percentage of lymphocytes in the infected group and reached  $42.6\% \pm 2.1$ . While in the animals of the second group, they were close to the natural ones and reached  $46.45\% \pm 2.89$ . There was no significant statistical difference between the experimental animals  $P > 0.05$ ,  $p > 0.01$  (Table 2).

**Single-core cells (M%) Monocytes:** The percentages of these cells increased in infected animals and reached  $6.33\% \pm 1.51$ . However, there was little change in the case of non-infected control animals, where they were  $4.15\% \pm 0.96$ . However, there were no significant statistical differences between the groups  $P > 0.05$ ,  $p > 0.01$  (Table 2).

**Bacterial cells (B%) Basophils:** In the first group of infected animals, the percentage of cells in the first group increased to  $4.67\% \pm 0.52$ , while the control group had a slight decrease of  $0.87\% \pm 0.58$ . A significant statistical difference was found at 5% 0.05% between the experimental groups. Table (2).

**Acid cells (E%) Eosinophils:** The percentage of acid cells in infected animals increased to  $5\% \pm 0.63$ , compared with non-tick control animals with  $1.5\% \pm 0.58\%$ . Significant statistical difference was found between the infected group and control group at  $P < 0.05$ . Table (2).

**Table 2: Percentages of the rates of white blood cells in experimental animals**

Types of blood cells					Groups
Acid cells	Basophil	Single-core cells	Lymphocytes	Neuromuscular cells	
$5\% \pm 0.63$	$4.67\% \pm 0.52$	$6.33\% \pm 1.51$	$42.6\% \pm 2.1$	$40.1\% \pm 4.84$	Infected
$1.5\% \pm 0.58$	$0.87\% \pm 0.58$	$4.15\% \pm 0.96$	$46.45\% \pm 2.89$	$47\% \pm 1.41$	Control group

$\pm$  = standard error.

p-Value = ( $P > 0.05$ ,  $p > 0.01$ )



**Packed Cell Volume (PCV):** The PCV in the experiment was close in both the tick infected and non-infected groups (control group) and reached  $28.67 \pm 3.26 \pm 28.5 \pm 0.58$ , respectively. There were no significant statistical differences between the two groups.

**Hemoglobinopathy (Hb):** Stabilization and convergence of hemoglobin in group I and II animals was also observed, and there was no significant change, with  $9.5 \pm 1.1$  g in the group of infected animals. Compared to the control animals in the second group where it was  $9.7 \pm 0.5$  g%. No significant differences were observed between the two groups.

**Red blood cell markers: Blood Indications:** MCHC, MCH, and MCV markers were determined by red blood cells, hemoglobin counts, and percentage of red blood cell counts. No type of anemia was observed in animals in the first two ticked and non-infected groups.

## DISCUSSION

There were no significant differences between the infected groups and the control group when reviewing the results of the blood samples for these groups in the total number of red blood cells, hemoglobin counts and packed cell volume of red blood cells. No type of anemia was observed, according to the results. None of the types of anemia, as indicated by the results, were shown by calculating the parameters of the red blood cell markers MCHC, MCH, MCV. This may be due to the small number of ticks fed to the experimental animals as well as the short duration of tick feeding on these animals.

The values of blood parameters in control animals have been more affected than those of infected animals. The role of Antibodies formed in the bloodstream of infected animals, which destroy the digestive tract of ticks feeding, which reduces the feeding process and incomplete and lack of blood absorption compared with control animals, which have low standards of these antibodies<sup>19,20</sup>.

In addition to the histological changes that occur in places where ticks are applied to treated animals that may cause the tick to be infected.

The incidence of white blood cells in the infected animals was relatively small compared to control animals without significant statistical differences between the groups. However, other observed the low rates after a

long period of infection, although we did not notice this in our current study of the possibility of shortening the feeding period.

Many have confirmed the high percentage of diphtheria and acidic cells in response to tick infection. This increase supports the results of the present study on this aspect with respect to the increase in the percentage of diphtheria and acid cells in infected animals, but this increase was higher than that recorded in rabbits with antigen Larvae ticks *Hyalomma a. Anatolicum* may be due to difference in the host user due to the differences between the host and the host's immune status<sup>22</sup>. The skin reactions in the tick adhesion area of the resistant animals stimulates the infiltration of the cells to induce allergic reactions. He noted<sup>23</sup> the introduction of echinoderms to the skin of rabbits protected by *Ixodes ricinus* after the infection type.

As discussed<sup>24,25</sup>, the importance of dengue and bacteriophagee in resistance against infection was determined by the criteria of resistance deficiency in guinea pigs that are protected by *Ripicephalus appendiculatus* antiperspirants after treatment with antimicrobial and antacids.

There was no role for the neutrophils in the tick-infected animals, which were gradually reduced during the experiment. This was consistent with the results of<sup>26</sup> which observed a slight increase in percentage in the early weeks of the experiment.

The difference may be due to the limited duration of the study and the type of animal used studying. Neutrophil cells are phagocytic cells that attack the microorganisms entering the body, but a small effect has been observed against *S. sanguineus* ticks, while diphtheria and acid cells have contributed to the resistance of guinea pigs against this type of tick<sup>27,28</sup>.

## CONCLUSIONS

No significant changes in blood parameters of tick-infected animals. The absence of any type of anemia in animals infected with ticks. We observed high percentages of Eosinophils and Basophils in tick-infected animals.

**Conflict of Interest:** This research is a personal non-profit work and there is no conflict of interest.

**Source of Funding:** None

**Ethical Clearance:** Ethical clearance was obtained from the Faculty Scientific Committee (Faculty of Veterinary Medicine, University of Kerbala) to Study of hematological changes in the experimentally infected sheep with ticks *Hyalomma spp.*

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# Study the Antioxidant Activity of Sage (*Salvia Officinalis*) Leaves Extract

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## ABSTRACT

This study was carried out to evaluate two type of sage (*salvia officinalis*) leaves extracts (Ethanolic and Water extracts) by using two methods (reducing power and chelating ability). So this study shows the high content of phenolic compound of ethanolic and water extract of sage (15.8 and 14.6) % respectively. The leaves of sag were locally obtained, twenty gram of ground material was extracted by 250 ml ethanol 95% or distilled water at boiling point, under reflux for one hr. The extractive was filtered and evaporated at 50 C° to the compete dryness. Total phenol assay, total flavonoid assay, reducing power assay, and chelating ability assay were observed in this study. Results revealed that the ethanoic extract had highest percentage of reducing power than water extract of sage leaves as so as the chelating ability percentage.

**Keyword:** extracts, sage, flavonoids, chelating ability, reducing power

## INTRODUCTION

*Salvia* is the largest genus of Lamiaceae family, includes about nine hundred species which are widespread in the world. *Salvia officinalis* the common sage, is the most representative species within the genus *Salvia*. It has been credited with a long list of medicinal uses: e.g. antiplasmodial, anti-inflammatory and antiseptic activities<sup>1</sup>.

The *Lamiaceae* family includes large number of plants, known for their antioxidant properties. Among these, salvia has been widely used and the antioxidant components have been identified. It has been established that the antioxidant effects of salvia are mainly due to the polyphenolic compounds<sup>2,3</sup>. The major phenolic compounds identified in the extract of salvia are carnosic acid, rosmarinic acid, salvianolic acid and its derivates – rosmanol, carnosol, epirosmanol, rosmadial and methyl carnosate<sup>4,5</sup>. The rosmanol is a major constituent among these, having strong antioxidant activities because these groups cause phenols to donate the hydrogen atoms

more easily to activate the free radicals, which interrupt the ant oxidation chain reaction<sup>6</sup>.

The most widely used synthetic antioxidants in food (butylated hydroxyanisole BHA, butylated hydroxytoluene BHT) are very effective as antioxidants but their use in food products has been failing off due to their instability, also due to a suspected action as promoters of carcinogenesis. For this reason, there is a growing interest in the studies of natural healthy additives as potential antioxidants<sup>7,8</sup>. In the present study, we focused on evaluating the antioxidant activity from natural source, in aqueous and ethanolic extracts of sag.

## MATERIALS AND METHOD

The leaves of sag were locally obtained, twenty gram of ground material was extracted by 250 ml ethanol 95% or distilled water at boiling point, under reflux for one hr. The extractive was filtered and evaporated at 50 C° to the compete dryness.

### Assays for the Antioxidant activity of Sage Extracts

**Total phenol assay:** A Folin-ciocalteu's colorimetric method was used as described by (Ayoola et al 2008)<sup>9</sup> a 2.5 ml of a ten-fold diluted Folin-ciocalteu's reagent and 2ml of 7.5% sodium carbonate solution were added to 0.5 ml of (1mg/ml)extract before the reaction allowed

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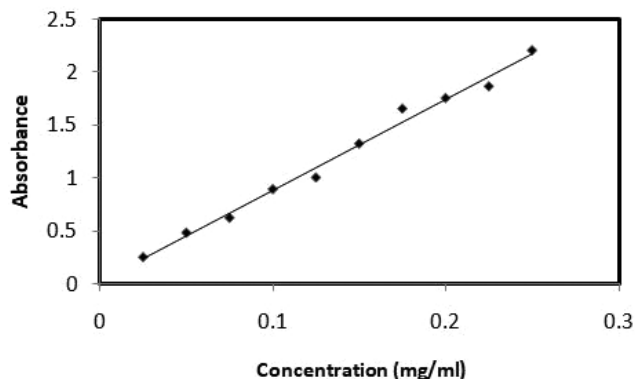
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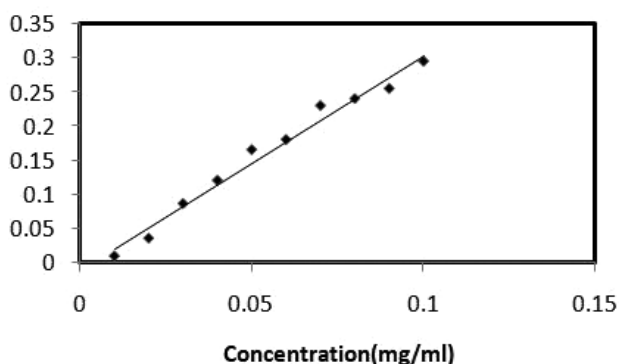
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standing for 30 min at room temperature. The absorbance was recorded at 760nm by using UV/VIS Spectroscan 80 D spectrophotometer. The total phenolic compounds were determined according to gallic acid standard curve (0.01 to 1 mg/ml) (fig.1).



**Figure 1: Concentration–response curve for gallic acid at 760 nm**

**Total flavonoid assay:** Total flavonoids in ethanolic and aqueous extracts of sag were determined according to (Rao et al, 2012)<sup>10</sup>. One ml extract solution (1mg/ml) was placed in 10 ml volumetric flask. 0.3 ml of 5% NaNO<sub>2</sub> solution and 5 ml of distilled water were added. After 5 min 0.6 ml of 10% AlCl<sub>3</sub> was added. 2 ml of 1M NaOH solution was added after another 5 min, and the volume was made up to 10 ml with distilled water. The mixture was mixed and the absorbance was measured at 510 nm. Total flavonoids were expressed as µg catechin equivalents per gram dry matter according to catechin standard curve (fig.2).



**Figure 2: Concentration –response curve for catechine at 510 nm**

**Reducing power assay:** The reducing power was estimated as described by (Chou et al,2009)<sup>11</sup>. 1 ml extract of ( 0.5-10 mg/ml) was mixed with 2.5 ml of 1% potassium ferric cyanide and 2.5 ml of 0.2 M (pH. 6.6) of sodium phosphate buffer, and incubated at

50 C° for 20 min. To stop the reaction, 2.5 ml of 1% trichloroacetic acid (TCA) was added to the mixture and centrifuge for 10 min at 3000 rpm. 0.5 ml of the supernatant was mixed with 1 ml of 1% ferric chloride and stand for 10 min. The absorbance was measured at 700 nm. BHT used as standard.

**Chelating ability assay:** Chelating ability was determined according to (Su et al,)<sup>12</sup> with some modification. 1 ml of (0.5-10 mg/ml) extract was mixed with 0.2 ml ferric chloride of 2 mM and 0.2 ml 8-Hydroxyquinoline(5mM). After 10 min at room temperature, the absorbance was determined at 562 nm. The EDTA-Na<sub>2</sub> was used as reference.

## RESULTS AND DISCUSSION

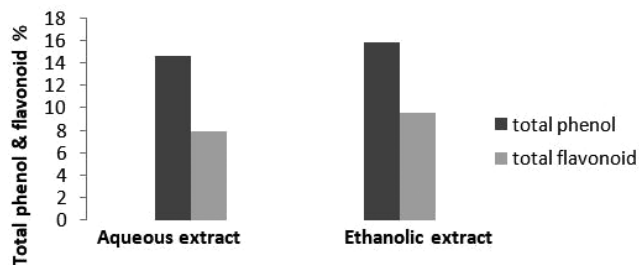
Polyphenols are aromatic compounds from the plant kingdom. They are important due to positive correlation with antioxidant activity. They are responsible for medicinal worth of plants<sup>13</sup>. Phenolic components show antioxidant potential due to their reduction potential<sup>14,15</sup>. Flavonoids are most important polyphenols. They have the ability to trap free radicals which are causes a number of diseases<sup>16</sup>.

Table-1, shows the percentages of flavonoids and total phenolic compounds. The total phenolic compounds which expressed as gallic acid and flavonoids as catechins were determined according to standard curves, flavonoids were determined by aluminum chloride colorimetric method and phenols by Folin-Ciocalteu’s colorimetric method

**Table 1: Phenolic and Flavonoids content in sag extracts**

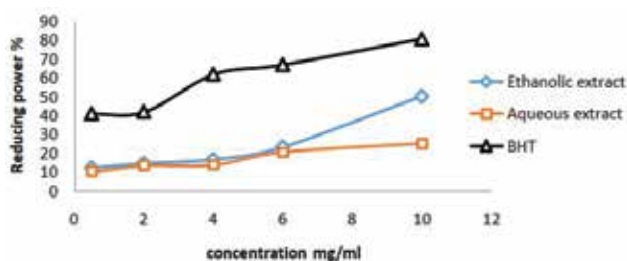
Extraction	Type of plant	Phenolic content %	Flavonoids content%
Aqueous	Sag extract	14.6	7.9
Ethanolic		15.8	9.6

As shown in fig 3, the high percentages of the flavonoids and total phenolic in alcoholic extract mean that, the ethanol as extracting solvent (due to the chemical composition of phenolic compounds) is more effective than water. These results are in accordance with those of (Nagwa et al)<sup>1</sup>



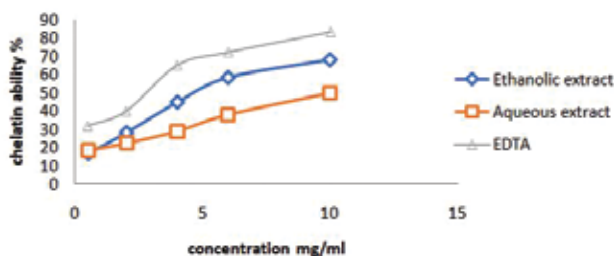
**Figure 3: Comparison of total phenol and flavonoid contents of sag extracts**

In this study, reducing power and chelating ability methods were used to determine the antioxidant activity, the results were summarized in Figures 4 and 5.



**Figure 4: Reducing power of aqueous & ethanolic extracts of sag as compared with BHT at the same concentration**

Reducing power indicates the compounds that are electron donors which act as primary and secondary antioxidants<sup>17</sup>. Fig 4 shows the reducing power of aqueous and ethanolic extracts of *sag* (as compared with BHT). From these results we can see that the reducing power was enhanced by increase concentration of samples. Higher reducing power might be due to higher amounts of total phenolic and flavonoid and the reducing power of a compound may reflect the antioxidant potential<sup>18</sup>. The phenolic compounds have been recognized as antioxidant agents which work as free radical oxidation terminators<sup>19</sup>, the reducing properties are associated with the presence of reductions<sup>20</sup>.



**Figure 5: Chelating ability of aqueous & ethanolic extracts of sag as comparad with EDTA at the same concentration**

Metal ions can play an important role in the acceleration the oxidation of biological molecules, therefore they may catalyze the formation of first few radicals that lead to propagation of the radical chain reaction in lipid peroxidation<sup>21,22</sup>. FIG 5 shows the Iron chelating ability of the ethanolic and aqueous extract of sag The highest chelating activity was observed in ethanol extract.

## CONCLUSIONS

The results of the present study showed that ethanolic extract was higher than aqueous extract in both reducing power and chelating ability assays. the ethanolic extracts of sag is high in phenolic compounds as compared with aqueous extracts. As a result, we are fully recommended the extract of sage as a natural preservative in the food systems.

**Conflict of Interest:** This research is a personal non-profit work and there is no conflict of interest.

**Source of Funding:** None.

**Ethical Clearance:** Ethical clearance was obtained from the College Scientific Committee (College of Agriculture, University of Baghdad) to use the leaves of sage plant for extracting 250 ml ethanol 95% or distilled water at boiling point

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# Effect of Winter Nutrition with Dietary Supplements on Activities of Honey Bees' Colonies

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## ABSTRACT

The study was conducted in the apiary which belonging to Al-Mussaib Technical College from the period of 2017/12/31 until 21/4/2018 in order to test the attractiveness of bees to three concentrations of sugar solution added to it the lemon and bitter orange. The results of the study showed that the average attractiveness of bees to the sugar solution was different and was dependent on the concentration of additives to the sugar solution. As for the sugar solution that the lemon added to it. The results showed that the highest average of attractiveness amounted of (234.93 bee.day<sup>-1</sup>), while the highest average of attractiveness amounted of (215.30 bee.day<sup>-1</sup>), While the percentage of sugar solution added to it the Bitter orange, where the highest percentage at concentration of 15% which amounted of (345.44 bee.day<sup>-1</sup>), while the lowest percentage for it at the concentration of 5% was amounted (317.444 bee.day<sup>-1</sup>). As for the relationships between the period and days, it has observed that the highest average of attractiveness was (2.58 bee.day<sup>-1</sup>) in the morning at 10% concentration, while the average of attractiveness was (2.33 bee.day<sup>-1</sup>) in the morning at 5% concentration. In the afternoon, the highest average of attractiveness was (15.36 bee.day<sup>-1</sup>) at a 15% concentration, and the lowest average of attractiveness was (7.58 bee.day<sup>-1</sup>) at a concentration of 5%. In conclusion, the bees were attracted to both solutions with different densities. Preferring bees for the sugar solution that added to it the lemon with low concentrations compared to the sugar solution added bitter orange to it.

**Keywords:** bee insect, lemon, honey bees, bitter orange.

## INTRODUCTION

Western honey bee (*Apis mellifera* L.) is a living insect living in the form of a colony, consisting of a group of individuals called workers, Their numbers reaches from hundreds to thousands with one queen, May be male with them or may be absent, They live together in a natural nest or in a man - made nest that is continuously active throughout the year<sup>1</sup>. Studies showed that honey limits the risk of cancer, where it turns out that the bee produces chemicals materials that prevent the growth and division of pollen grains cells found in honey and showed the non-division of cancer cells and spread. This study was followed by a scientific medical test, which was tested by a group of beekeepers who proved that their bodies

were free from this disease. Where they continued to consume honey in their daily diet, whether the Royal jelly or pollen grains. These experts have instructed that the lack of cancer because of the containment honey of pollen grain<sup>2</sup>. Honey is considered one of the most important bee products besides its products of pollen grains, Royal jelly, wax, polypropylene and honey bee venom. It is a sweet sugary substance with a flavor and aromatic aroma collected by the bee workers from the plant nectar glands as well as the sugary secretions of some insects belonging to the Homoptera order as well as fruit juices (Honey dew). The bees mature and turn it into honey stored in the honeycomb, on the other hand, the bees are social insects, which are distributing of work among the colonies of the community and that the work conducted by the workers are according to their age, where those who are 1-21 days old are called house bee workers because they do not go out of the beehive and work inside the beehive. They clean the beehive, take care of the incubation and queen, produce Royal jelly and wax to build the honeycomb, guard and defend the beehive. After the 21st day they turn to field

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duties where they gather food (pollen), nectar and water from the plants after conducting a pre-exploration process. These duties depend on the activity of bee workers in their ability to Grazing and on different levels, and this comes through the amount of food it supplies, which gives it the necessary energy. It is known that carbohydrates is the main food that provides energy to the body. Therefore, it is dependent on the industrial feeding of water and sugar in the supplying of bee colonies with supplied food for energy in the case of lack of food sources, lack of stored honey in the beehive and may be or lack of food sources in the pasture as a result of environmental changes (heat - humidity - rain - wind), leading to effect on the flowering date of flowers and the Nectar secretion sometimes and the dryness of the secluded nectar at other times, this makes the colonies of the community consume honey and stored pollen in the beehive and reduce its quantity, forcing the beekeeper to intervene and transfer honey tablets and pollen excess of the need of the community to the needy community, but such this work cannot be done at all times of the year because of lack of its availability in sufficient quantities The feeding process requires with honey and pollen alternatives<sup>3,4</sup>. The percentage of water in honey ranges between 23-13% and with average about 17% and may reach up to 9% in dry areas where the relative humidity of air is low. The concentration of water in honey is influenced by environmental factors such as temperature and humidity ratios present in the nectar and the degree of honey maturity and its storage conditions after harvesting and sorting<sup>5</sup>. Honey bees, like any living organism, also require the availability of carbohydrates, proteins, fats, minerals and water for their growth, development and reproduction, and obtain them by collecting water, nectar and pollen. The nectar is a sugar source. The pollen is a source of proteins, fats, vitamins, minerals, Sterols and other nutritional requirements. The beehive consumes some of what it collects to sustain its various activities and stores more than its needs in the honeycomb to benefit from it when needed. When more food stocks are available, the colonies get less strong before the onset of the honey-pollen season, while the opposite occurs in food-insecure colonies<sup>6</sup>. Studies have shown that the colonies during the times of the year and especially in the spring requires at least 6.8 kg of honey and 19.9 kg of pollen and that one larva needs 100 mg pollens to grow and develop into a complete insect. The basic color of the honey is the result of the components of water dissolving from the plant origin is Secreted

from the nectar, which are the extracts of chlorophyll, carotene, Xanthophylls and other depends on the type of plant and weather conditions<sup>7</sup>. The main goal of honey bee breeders is to maintain the strength and activity of honey bee colonies because it is important in increasing their productivity and requires a sufficient stock of pollen and honey, which encourages the queen and push them to continue to ovulation, which led to increasing the number of bees and the growth and development of the colonies. Most studies indicated that the sugar solution was more receptive to the bee colonies and was widely used as an alternative to honey or nectar, and that some protein sources were used as alternatives and supplements for pollen, which contributed to activating the colonies and maintaining their strength<sup>1</sup>. The present study aims to study the effect of winter nutrition on the attractiveness of bee colonies and knowing the best and most nutritional supplements for bees during the winter period.

## MATERIALS AND METHOD

**Preparation of Beehives:** This study was conducted in the apiary of the Department of Biological Resistance, Al-Mussaib Technical College for 2017-2018 on the local honey bee colonies where the beehives were divided into three replicates for each replicate containing three beehives. Where each beehive contains 6 honeycombs covered with bees, where it was considered to be the same strength and the queen at the age of one years (according to the log of the beekeeper that was purchased the beehive from which).

### Preparation of Solutions

**Preparation of the Sugar Solution:** The sugar solution was prepared with a concentration of 1 water: 2 sugar. The water was boiled, sugar added and stirred until a homogeneous solution was obtained.

**Preparation of Additives:** Three treatments were prepared adding to the sugar solution for the study, as follows:

Sugar solution added to it the natural lemon solution after the age and purification it from impurities and the three concentrations of 5 ml, 10 ml, 15 ml per liter of the sugar solution according to the equation of concentration

$$H1 \times V1 = H2 \times V2$$

Sugar solution added to it the natural Bitter orange solution after the age and purification it from impurities

and the three concentrations of 5 ml, 10 ml, 15 ml per liter of the sugar solution according to the equation of concentration

$$H1 \times V1 = H2 \times V2$$

**Method of Taking Readings:** For the purpose of determining the attractiveness of bees and its preference for different sugary structures, the readings were taken from 31/12/2017 until 21/4/ 2018, with the rate of two readings per week divided by two days to determine the effect of the time on the attractiveness from 9 to 10 am and from 12 to 1pm, Where one honeycomb was assigned to each beehive (feeding) where the lemon solution is placed in concentrations of (5, 10, 15 ml.L<sup>-1</sup> sugar solution), with one liter per dish in the beehive.

**Statistical Analysis:** The experiment was designed according to the Randomized Complete Block Design (RCBD). The results were statistically analyzed

according to the ANOVA method and the average was measured according to the least significant difference (L.S.D) at a significant level of 0.05%<sup>8</sup>.

## RESULTS AND DISCUSSION

Table (1) shows that the honey bee workers were more attracted to the sugar solution added to it the lemon at a concentration of 15% which amounted the highest average of (251.30 bees.day<sup>-1</sup>) while the lowest average attraction of workers for the sugar solution added to it the lemon was at 5% concentration which amounted (234.93 bees.day<sup>-1</sup>). The reason for the different averages of attractiveness of honey bee workers for feeding solutions is due to the difference of bees' ability to palatability these substances and attract to them. This results agree with<sup>9</sup> indicated that bees do not collect nectar that cannot be palatability and the sugar content is not less than 20%.

**Table 1: shows the effect of the sugar solution added to it lemon and the attractiveness of honey bees during winter feeding**

Treatment	Concentration	Readings					Average
		1/2	1/9	1/16	1/23	1/30	
sugar solution with lemon	5%	355.67	22.83	145.17	305.17	345.8	234.93
	10%	370.00	34.0	125.5	356.6	362.62	250.56
	15%	371.33	35.50	123.00	361.50	367.17	251.30
Average		366.66	30.44	131.22	341.11	358.5	—

LSD=11.776 for periods, L.S.D=9.251 for concentration, L.S.D=9.362 for interaction

Table (2) shows that the honey bees workers have more likely preferred the sugar solution added to it Bitter orange a concentration of 51% where the highest attractiveness for it at this concentration which amounted of (345.44 bee.day<sup>-1</sup>), while the lowest average of attractiveness at concentration of 5% which amounted of (317.44 bee.day<sup>-1</sup>). As for the average time period, where the highest average of attracting workers on 2018/2/13 was amounted (232.67 bee.day<sup>-1</sup>). The previous results show that bees can distinguish the concentration of the sugar solution so that it is first attracted to high concentrations and then the lowest. These results agree with<sup>1</sup>.

**Table 2: shows the effect of the sugar solution added to it Bitter orange and the attractiveness of honey bees during winter feeding**

Treatment	Concentration	Readings					Average
		2/6	2/13	2/20	2/27	3/6	
sugar solution with lemon	5%	337.17	195.50	400.83	293.50	368.50	345.44
	10%	313.8	261.00	316.67	288.50	331.00	342.028
	15%	321.50	241.50	368.67	251.33	431.17	317.444
Average		324.1	232.67	362.06	277.7	376.8	—

LSD= 27.625 for periods, L.S.D= 9.311 for concentration, L.S.D= 8.412 for interaction

Table (3) shows the interaction among of the treatments, daylight hours and concentration, Where the highest average was at 12 pm, with concentration of 15% which amounted (15.36 bee.day<sup>-1</sup>), while the lowest average of attractiveness at 9 Am, with concentration

of 5% which amounted (2.33 bee.day<sup>-1</sup>), Where at the afternoon, we noted that the number of bees has increased to suit the weather conditions, where the intensity of the work of bees at this period was increased. This results agree with<sup>10</sup>.

**Table 3: Shows the interaction between the hours of the day and the treatments in attracting honey bee workers during winter feeding**

Treatment	Concentration	lemon					Bitter orange					Average
		1\2	1\9	1\16	1\23	1\30	2\6	2\13	2\20	2\27	3\6	
9 Am	5%	2.66	4.16	2.00	1.50	2.33	1.33	1.33	1.17	2.44	1.44	2.33
	10%	5	3.83	1.82	0.83	2.67	1.33	2.58	1.04	3.14	3.10	2.58
	15%	4.69	2.0	2.17	2.17	2.33	1.17	1.34	1.07	1.17	1.31	2.35
12 Pm	5%	7.33	7.17	5.67	8.83	9.83	6.67	7.58	5.15	6.73	4.13	7.58
	10%	11.50	10.17	10.0	16.67	12.83	31.0	11.10	11.04	12.03	9.11	12.11
	15%	13.19	10.17	10.0	16.67	12.83	31.0	10.15	9.18	13.04	8.13	15.36
Average		12.1	23.1	16.5	26.3	22.17	27.0	21.2	20.13	23.1	24.5	—

LSD= 19.533 for days, L.S.D= 19.422 for periods, L.S.D= 16.515 for interaction

**CONCLUSION**

The bees were attracted to both solutions with different densities. Preferring bees for the sugar solution that added to it the lemon with low concentrations compared to the sugar solution added bitter orange to it.

**Conflict of Interest:** This research is a personal non-profit work and there is no conflict of interest.

**Source of Funding:** None.

**Ethical Clearance:** Ethical clearance was obtained from the College Scientific Committee (Furat Al-Awsat Technical University, Al-Mussaib Technical College, Iraq) to study effect of winter nutrition with dietary supplements to test the attractiveness of bees to three concentrations of sugar solution added to it the lemon and bitter orange on activities of honey bees’ colonies.

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# Use Autologous Platelets Rich Plasma in Treatment of Skin Wounds in Rabbits

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## ABSTRACT

This experiment was designed to study effect of plasma-rich platelets (PRP) on tissue healing rates of skin lesions in rabbits. Sixteen healthy adult rabbits were used clinically from both sex (weight from 1.1 to 1.9 kg). All animals (4 cm<sup>2</sup>) were formed in the abdomen. Group (A) was injected with a single-dose PRP dose. While a control (group B) was injected with saline solution injected into the wound position in both groups. On day 3, 7, 14 and 21 posts samples of skin tissue samples were collected to examine the tissue each time two rabbits. The results revealed, clinically, that the wound healing rate was the same in two groups, no differences when the section was taken from the edge of the wounds, and the histological result showed: On the third day of the wound healing group (A) (control group) a demarcation line consisting of polymorph nuclear), The skin was thick at the edges of the cut with the inflammatory cell group (B) (treatment group) inflammatory responses were detected in the lesser frequency range of the control group. On the seventh day of the wound healing group in the skin (A) shows the presence of a few small vessels, and the collagen fibers organized give a tightening force of the tissues, Group B is shown in small vessels, good tensile strength and improved wound healing. On the fourteenth day of the A-group, the density of the blood vessels is noticeable. Group B shows an increased blood vessel density in group A. On the 21st day of the wound healing group (A), there is an increase in blood vessel density and collagen bundle. The wounds of group (B) contain an abundance of fiber and collagen bundles, through the expansion of the rich blood vessels.

**Keywords:** Platelets, platelets rich plasma, Rabbits, Skin, wound healing.

## INTRODUCTION

The main aim of wound attention is to achieve rapid and purposeful recovery with a cosmetic scar<sup>1</sup>. Wound healing involves a series of events (coagulation, inflammation, regulation of granular tissue, epithelial structure and repair). These proceedings are created by encouragement and regulation of cellular activities through the communication between signals made by cytokines and growth factors<sup>1,2</sup>. (PDGF), change factor beta-alpha (TGF- $\beta$  and TGF- $\alpha$ ), thrombocytopenic growth hormone (PDEGH), growth factor fibroblast (FGF) The vascular endothelial growth factor (VEGF), interleukin 1 (IL-1), interleukin 2 (IL-2), and platelet stimulation factor 4 (PAF-4) are released<sup>1,2,3</sup>.

These factors play a special role in tissue repair (re-sedimentation and vascular proliferation), extracellular matrix production, and enrolment of mesenchymal cells<sup>2</sup>. PRP is a concentrated platelet creation used in clinical trials to quicken wound healing<sup>4,5</sup>.

Platelet-rich plasma (PRP) or platelet center (PC) are easy and cheap products to get and expose important growth factors involved in tissue renovation. An example of a growth factor is alpha granules of triggered plates, which stimulate chemical attraction, bone fibrosis and angiogenesis<sup>6</sup>. Growth factor production occurs in many cells and tissues such as fibroblasts, plaques, endothelial cells, bone structures, leukocytes, saliva, lacrimal glands, and others. However, in many studies, the most interesting goal is platelets, where they are moderately easy to get and have other important materials for restoration and tissue repair<sup>7</sup>.

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Growth factors of platelet growth factor (PDGF), conversion of beta growth factor (TGF $\beta$ ), endothelial

growth factor (VEGF), endothelial growth factor (EGF), fibroblast growth factor (FGF) and insulin-like growth factor)<sup>8</sup>. Among the most abundant growth factors present in alpha granules of platelets, thrombocytopenic growth factor (PDGF) and TGF $\beta$ . Both have specific activities such as angiogenesis, valve formation and activation of macrophages<sup>9</sup>. The functions performed by these agents are very important for body functions and angiography, for healing surgical wounds and for reducing postoperative complications<sup>10</sup>. Therefore, this study was aimed to evaluate the benefits of self-PRP in skin healing in rabbits

## MATERIALS AND METHOD

Sixteen adult clinically healthy rabbits of both sexes weigh from 1.1 to 1.9 kg. The animals were housed in the Animal Farm of the College of Veterinary Medicine at Karbala University and were kept in individual cages in a natural environment including climate, management and nutrition. All animals were subjected to the creation of a full wound (4 cm 2) in the abdomen after preparation for sterile surgery<sup>11</sup>.

General anesthesia was induced by diazepam (diazepam 10). The ampoule contains 2 ml (10 mg/ml<sup>2</sup>), Aleppo, pharmaceutical industries, Aleppo - Syria) as surgery at 1 mg/kg body weight. After 10 min syringe with zylazine (2% zylazine® contains 50 ml (20 mg/1 ml), Ceva Saute animal, Spain) at a dose rate of 10 mg/kg body weight. Ketamine® (10%) contains 10 ml Vet.Injection, Kepro Pharmaceuticals, Netherlands) at a dose rate of 50 mg/kg body weight. All these drugs are injectable<sup>12</sup>.

On each animal, one full thickness (4 cm 2) was created in the abdominal area using a mold made from X-ray film for all animals and the wound tailor was sewn by 3-0 silk by intermittent horizontal stitching. PRP was injected into the wound seat immediately after establishment Wound in treatment group (B) during injection of the control group (A) with a normal saline solution.

On day 3, 7, 14, and 21 processes after skin tissue biopsy samples were collected for histological examination of groups A and B group treated each time two rabbits. The samples were fixed in 10% neutral formalin, cut into 5  $\mu$ m thick sections, stained with hematoxylin and eosin (H & E), and investigated for microscopy<sup>13</sup>.

## RESULTS AND DISCUSSION

During the postoperative period, the animals remained intact, without clinical indication of infection. Microscopy also confirmed sterile conditions during wound in all groups. Wound healing is a complex biological process that occurs in all tissues in all organs of the body. Various types of cells, including keratinocytes, spores, plaques, lymphocytes, fibroblasts and endothelial cells, are involved in this process<sup>14</sup>.

On the third day of the wound healing group (A) (control group) was the dominant inflammatory reaction. On the surface of the skin, necrosis of the skin tissue has been satisfied due to mechanical damage. This phase was also observed under tissue necrosis. The demarcation line consists of polymorphonuclear (PMN), thick-skinned at the edges of the cut with inflammatory cells, while inflammatory group reactions were observed in the lower frequency range of the control groups (Figure 1).

The inflammatory response began shortly after the shock on the wound event, the first stage of wound healing. During this response the wound and surrounding tissue becomes inflamed and the cells, especially the neutrophils and monocytes, are moved to infiltrate the clot and begin the processes involved in the synthesis of the granular tissue<sup>15</sup>.

On the seventh day of the onset of the wound healing group (A), Newly organized collagen bundles and relatively advanced epithelium have increased at the intersection of wounds to PRP treated wounds (group A) compared to untreated wounds (group B). Numerous small vessels (blood vessels) have also appeared in the PRP treated tissue, while only a few of the vessels are present in the control tissues. Because organized collagen fibers give snugger strength to tissue, the arrangement of collagen observed in the experimental group will be consistent with tissue that possesses good tensile strength and improves wound healing (Figure 2).

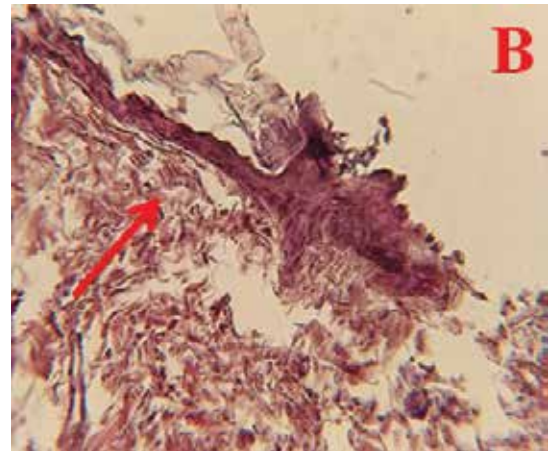
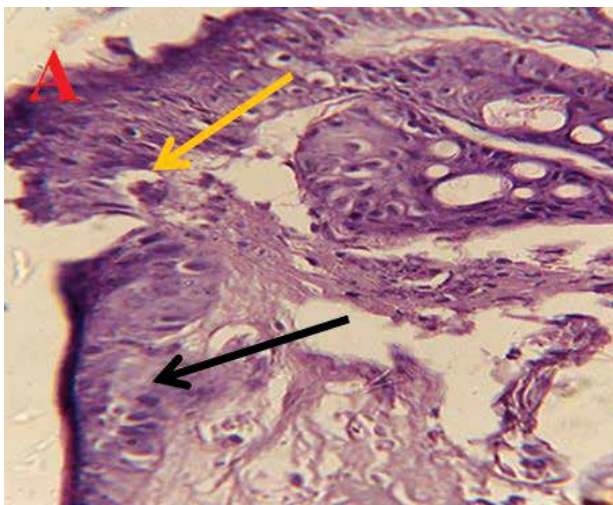
The wound edges bind the cell surface to fibroblastic contraction, also from other fibroblasts. Fibrin or fibrinogen was shown to interact specifically with platelets<sup>16</sup>.

On the fourteenth day of skin healing there was a marked increase in blood vessel density in groups treated with PRP compared to control group (B). Therefore,

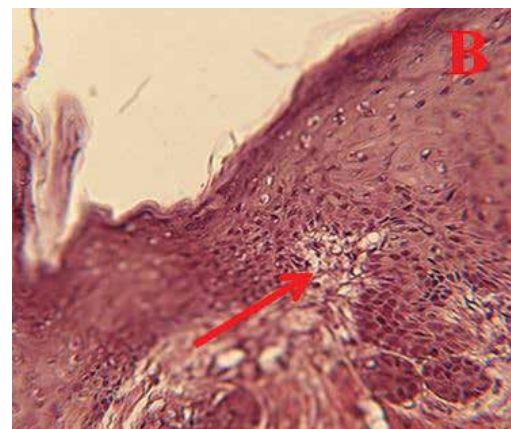
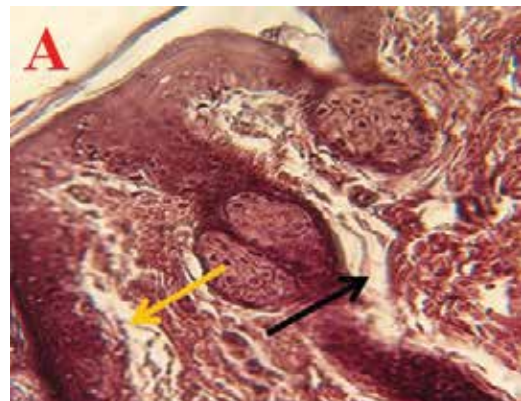
it can be established that the PRP treatment group enhanced blood vessels in the wound bed compared with any treatment groups (Figure 3).

A small amount of output voltage as long as the collagen bundle was susceptible to stress and collagen arrangement was collagen<sup>17</sup>. In the 21st day of skin healing wounds all wounds containing an abundance of fibroblasts and collagen bundles, through the expansion of excessive blood vessels are only noticed in wounds treated with PRP (Figure 4). Evolving new treatments such as PRP can play auxiliary role in a homogeneous treatment design and quality. PRP self-application on soft tissue healing has been a major concern for most of the past two periods. There are many growth factors at high concentrations within the PRP. Some include PDGF, TGF- $\beta$ , VEGF, EGF and IGF. PDGF, TGF- $\beta$ , VEGF, and EGF have been shown to increase 3 to 7 times in self-PRP<sup>18,19</sup>. In addition, thrombocytopenia contains many active total and chemical growth factors, which regulate basic procedures in tissue repair, including cell proliferation, chromium, migration, cellular differentiation, and extracellular matrix abstraction<sup>20,21</sup>.

According to the current study potential, the PRP effect in wound healing has indicated positive results similar to PRP in accelerating epithelial migration, vascular response and tissue mobilization. In parallel, many clinical studies, both in human medicine and veterinary medicine, have shown the restoration of tissue integrity of the positive role of plaques in natural wound healing<sup>22,23</sup>. After applied locally, platelets hasten the healing of normal tissues and encourage healing of vulnerable wounds<sup>24,25</sup>.

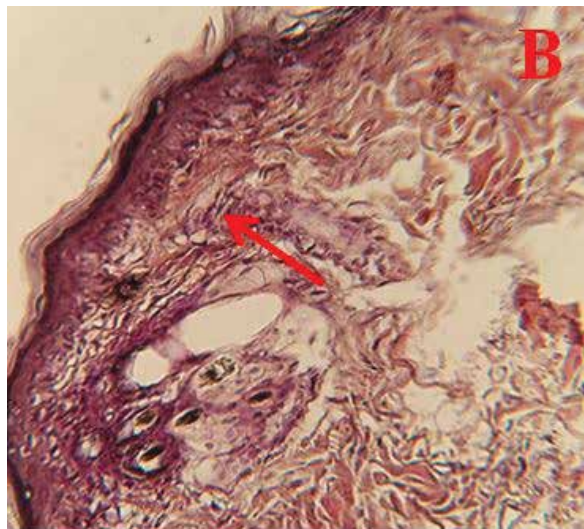


**Fig(1) histological cross section of skin show: (A) 3rd day wound healing demarcation line consisted of polymorphonuclear (PMN) (  $\rightarrow$  ), the epidermis was thickened at its cut edges with inflammatory cells (  $\rightarrow$  ), (B) 3rd day wound healing inflammatory responses were detected at lesser frequency range than the control groups (  $\rightarrow$  ). (H & E stain) 40X**

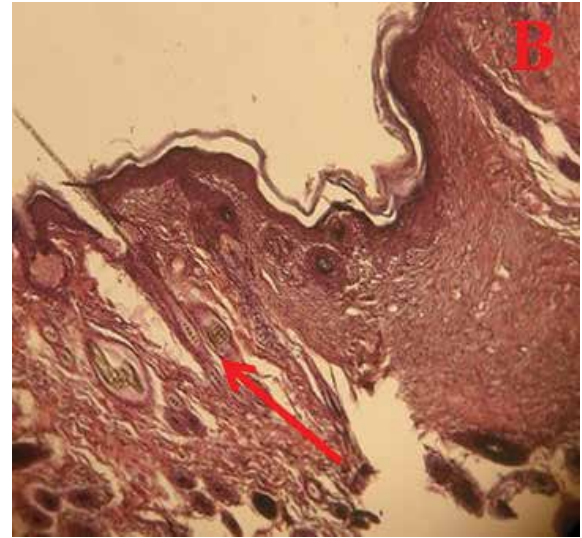
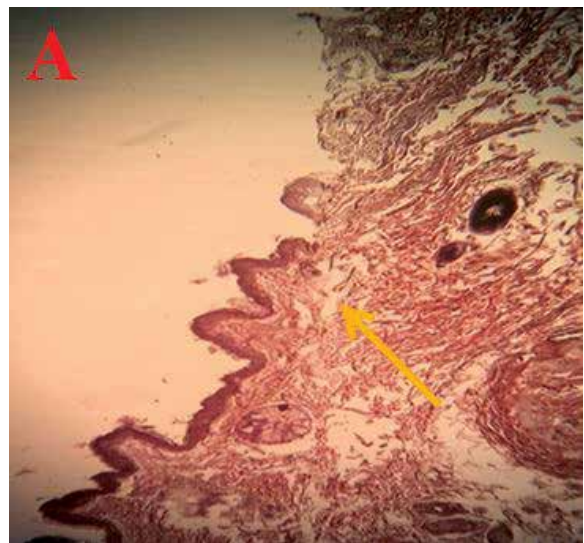


**Fig. 2: Histological cross section of skin show: (A) 7th day wound healing which few small vessels were present (  $\rightarrow$  ), prearranged collagen fibers give tensile strength to the tissue (  $\rightarrow$  ) (B) 7th day wound healing increased in small vessels, good tensile strength and enhanced wound healing (  $\rightarrow$  ). ((H & E stain) 40X.**





**Fig. 3: Histological cross section of skin show: (A) 14th day wound healing which vascular density was noticeable ( → ) (B) 14th day wound healing increased vascular density than in (A) ( → ). ((H &E stain) 40X.**



**Fig. 4: Histological cross section 21th day wound healing show:(A) increase of vascular density and collagen bundle ( → ). (B) wounds kept plentiful fibroblasts and collagen bundles, through rich neovascularization ( → ) (H &E stain) 40X.**

The results of the systematic evaluation and histological investigation exposed that the wound healing time for the PRP treatment group was shorter than the control group.

**Conflict of Interest:** This research is a personal non-profit work and there is no conflict of interest.

**Source of Funding:** None.

**Ethical Clearance:** Ethical clearance was obtained from the College Scientific Committee (Faculty of Veterinary Medicine, University of Kerbala) to use the rabbits in this study for evaluate skin healing.

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# Effect of Using Prebiotic (Dandelion) and Probiotic (*Bacillus subtilis*) on Some Physiological and Immunological Traits of Broiler Chicken

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## ABSTRACT

This study was aimed to investigate the effect of probiotic (*Bacillus subtilis*), prebiotic as dandelion plant (*Taraxacum Officinale*) or combination (synbiotic) on the improvement of cellular and humeral immunity and broiler performance. A total of 320 straight run one-day broiler chicks Ross 308 were distributed randomly to four treatments were design into 4 replicates. Each replicate was subdivided to 20 birds/pen. The control group (CON) fed basal diet without any additives. The dandelion group (DA) fed (10g/kg) dandelion as prebiotic with basal diet. The *Bacillus subtilis* group (BS) fed ( $3 \times 10^5$  cfu/kg) (300 ppm) *Bacillus subtilis* as probiotic with basal diet. Meanwhile, the combination group (DA-BS) fed 10g/kg dandelion and  $3 \times 10^5$  cfu/kg (300 ppm) *Bacillus subtilis* with basal diet. Blood samples were collected on days 9, 20, 35 of the study. The groups given (DA-BS), (DA), and (BS) respectively showed lower significance ( $P \leq 0.05$ ) of cholesterol, triglycerides TG, LDL, and vLDL, also liver enzymes AST, ALT and ALP compare with the (CON). However, HDL was increase significantly ( $P \leq 0.05$ ). The improvement of immune response and broiler performance was showed that CD4, CD8 and CD4/CD8 ratio and IgG titer against Newcastle Disease ND were improve significantly ( $P \leq 0.05$ ) in the (DA-BS), (DA), and (BS) groups respectively compare with the (CON). Live body weights (BW), Body weight gain (WG), Feed intake (FI), and Feed conversion ratio (F.C.R.) were improve in the (DA-BS), (DA), and (BS) groups respectively compare with the (CON). In conclusion, adding of the probiotic and the prebiotic as combination (synbiotic) to broiler chicken' basal diet given the higher immune response by enhancing cellular and humeral immunity. In addition, improving lipid profile, liver enzymes and broiler performance.

**Keywords:** Broilers, probiotic, prebiotic, symbiotic, lipid profile, liver enzyme, cellular and humeral immunity.

## INTRODUCTION

Antibiotic growth promoters AGPs usage in European Union were baned on 2006<sup>1</sup>. Therefore, it has been appeared subclinical necrotic enteritis beside of dysbacteriosis that led to poor performance have been reported by (Huyghebaert *et al.*)<sup>2</sup>.

Researchers focus on natural material that have positive impact on animal health and production like probiotic and prebiotic, synbiotic, essential oil, herbal and organic acids<sup>3,4,5,6,7,8,9,10</sup>. Probiotics act to enhance the body health by promoting mucin secretion.

Mucin is a glycoprotein and major constituent of the epithelial mucous. It acts to improve barrier function and competitive exclusion of pathogenic bacteria<sup>11</sup>. Probiotic enhance antimicrobial substances production by producing lactic acid and acetic acid which capable to lower of the intracellular PH of bacteria leading to the cell death<sup>12</sup>. In addition, probiotic bacteria have been reported to exert an immunomodulatory effect by ability to interact with epithelial, dendritic, monocyte/macrophage and lymphocyte cells through pattern recognition receptors (PRRs)<sup>13</sup>. The use of probiotic can be disintegrating of bile salts and deconjugate the activity of acetic acid and lactic acid that led to reduce the PH of the intestinal tract then reducing the cholesterol concentration<sup>14</sup>. Another explanation, who found that probiotic microorganisms inhibit hydroxymethyl-glutaryl-coenzyme A (HMG-COA). It acts as an enzyme

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responsible for in the cholesterol synthesis pathway lead to decrease cholesterol synthesis<sup>15</sup>.

Dandelion (*Taraxacum Officinale*) is a well-known herbal medicine. Inulin is the most commonly and most effective substance in dandelion<sup>5</sup>. The presence the  $\beta$ -glycosidic bond in inulin specific structure, it is not hydrolysis by the digestive enzymes in the upper GIT of monogastric animals and human<sup>16</sup>.

Prebiotic such as fructooligosaccharide and inulin are indigestible, viscous, fermented compound and soluble that participate to hypocholesterolemia by two mechanisms: short-chain fatty acid production (SCFAs) based on selective fermentation by intestinal bacterial microflora and decrease cholesterol absorption accompanied by enhanced cholesterol excretion via feces<sup>17</sup>. Also, Inulin lower the level of blood cholesterol by inhibiting the activity of HMG-CoA (hydroxymethylglutaryl-CoA) reductase<sup>18</sup>. This study was aimed to investigate the effect of probiotic, prebiotic or combination (synbiotic) on the improvement of cellular and humeral immunity, lipid profile and liver enzymes; in addition, the body health and broiler performance.

## MATERIAL & METHOD

**Bird, housing and feeding:** A total of 320 straight run one-day broiler chicks Ross 308 were distributed randomly to four treatments were design into 4 replicates. Each replicate was subdivided to 20 birds/pen. The control group (CON) fed basal diet without any additives. The dandelion group (DA) fed 10g/kg dandelion as prebiotic with basal diet. The *Bacillus subtilis* group (BS) fed ( $3 \times 10^5$  cfu/kg) 300 ppm *Bacillus subtilis* as probiotic with basal diet. The combination group (DA-BS) fed 10g/kg dandelion and  $3 \times 10^5$  cfu/kg 300 ppm *Bacillus subtilis* with basal diet. Feed and water provided *ad Libitum* to the end of the study. All chicks received starter diet from (1-21 days) and finisher diet from (22-35 days). The starter and finisher diet of the experiment were prepared as mash and were met the NRC requirements<sup>19</sup> (table 1.).

**Table 1: Ingredients and nutrients composition of starter and finisher diets**

Ingredients	Starter % (1-21 days)	Finisher % (22-35 days)
Corn	56	59
Soybean	33.5	33

Conted...

Flour	5	2
Corn oil	1.5	2.5
Provimi Premix	2.5 (starter premix 3088)	2.5 (finisher premix 3110)
alculation composition	100%	100%
Crude protein CP%	21	20.27
Crude fiber CF%	2.77	2.74
Calcium Ca%	0.961	0.919
AV-phosphorus	0.42	0.371
ME poultry kcal/kg	2.959	3043
AV-methionine	0.47	0.42
AV-TSAA	0.74	0.68
AV-threonine	0.63	0.61
AV-Lysine	1.18	0.98
Electrolytes	263	241.12

Premixes 3088 and 3110 were used manufactured by (Provimi Jordan Co. Amman, Jordan).

**Drugs therapy and vaccination program:** There is no drug therapy was used on the day of hatch. All birds were vaccinated with commercial ND and IB Disease attenuated vaccine NOBILIS® MA5 + CLONE 30 at 10 days of age by spray method. Then, all birds were vaccinated with Nobilis® Gumboro D78 by drinking water at 14 days of age. All vaccines were from MSD Animal Health Company

**Blood samples and laboratory analysis:** All blood samples were collected at days 9, 20, and 35 of age from five birds in each replicate randomly were obtained from the wing vein in a test tube with EDTA anticoagulant and without anticoagulant. Test tubes of EDTA anticoagulant were used to estimate CD4, CD8 and CD4/CD8 ratio by using flow cytometry technique. Other tubes without anticoagulant were allowed to clot and centrifuged for 10 minute/ 3000 rpm. Serum was collected and stored in deep freeze (-20) until analysis. Blood serum were used to determine ELISA antibody titer against ND disease vaccine, liver enzymes and lipid profile<sup>20</sup>.

**Statistical analysis:** Data were analyzed with one-way ANOVA test by using the general linear model (GLM) procedure SPSS 22.0 software<sup>21</sup>. Four treatment means were separated using a "protected" Duncan's analysis in level (0.05).

### RESULTS & DISCUSSIONS

Our results of the current study showed a significant decreased ( $P \leq 0.05$ ) in serum cholesterol, triglyceride, VLDL, and LDL, also liver enzymes AST, ALT and ALP of the (DA-BS), (BS), and (DA) groups respectively; however, HDL was increase significantly ( $P \leq 0.05$ ) in the same groups (table 2).

**Table 2: The effect of probiotic, prebiotic and symbiotic on liver enzymes and lipid profile at 35 days of the study (Mean ± SE)**

Parameters	Treatments			
	CON	DA	BS	DA-BS
Cholesterol (mg/dl)	190.00 ± 1.83 A	116.00 ± 1.31 B	116.00 ± 2.09 B	88.60 ± 1.31 C
Triglyceride (mg/dl)	127.40 ± 2.98 A	106.40 ± 1.58 B	97.00 ± 2.73 B	94.60 ± 2.69 B
HDL-CH (mg/dl)	74.40 ± 1.72 A	57.20 ± 1.50 B	51.20 ± 2.82 B	44.00 ± 1.67 C
VLDL-CH (mg/dl)	24.68 ± 1.88 A	21.28 ± .918 B	19.68 ± .659 C	22.52 ± 1.41 AB
LDL-CH (mg/dl)	81.40 ± 1.20 A	51.92 ± 1.79 B	42.52 ± 1.376 C	42.64 ± 1.114 C
AST (U/100ml)	23.80 ± 1.93 A	22.40 ± 1.20 AB	21.40 ± 1.86 BC	19.40 ± 7.48 C
ALT (U/100ml)	20.20 ± 1.02 A	13.60 ± 1.96 C	17.00 ± 7.07 B	13.60 ± 9.27 C
ALP (U/100ML)	269.20 ± 1.09 A	243.60 ± 4.79 A	215.00 ± 1.69 B	200.40 ± 2.08 B

Different letters represent a significant difference at ( $p \leq 0.05$ ).

Cellular immunity CD4, CD8 and CD4/CD8 ratio and humeral immunity IgG titer against ND were improved significantly ( $P \leq 0.05$ ) in the (DA-BS), (DA), and (BS) groups respectively compare with the (CON) (table 3 and 4).

**Table 3: The effect of probiotic, prebiotic and symbiotic on cellular immunity at 9 and 20 days of the study (Mean ± SE)**

Parameters	Days	CON	DA	BS	DA-BS
CD4%	9 day	18.33 ± 0.88 C	20.07 ± 2.11 BC	25.95 ± 2.29 B	36.03 ± 3.26 A
CD8%		14.02 ± 1.38 C	19.82 ± 1.59 B	16.46 ± 0.68BC	25.86 ± 1.12 A
CD4/CD% ratio		3.98 ± 0.69 C	5.03 ± 1.15 BC	6.54 ± 0.83 AB	8.45 ± 0.22 A
CD4	20 day	0.33 ± 0.05 C	1.35 ± 0.10 B	1.88 ± 0.27 AB	2.30 ± 0.29 A
CD8		13.40 ± 0.50 C	17.94 ± 1.67 B	18.06 ± 0.65 B	29.08 ± 1.18 A
CD4/CD8% ratio		0.12 ± 0.03 C	0.72 ± 0.06 AB	0.62 ± 0.07 B	0.89 ± 0.04 A

Different letters represent a significant difference at ( $p \leq 0.05$ ).

**Table 4: The effect of probiotic, prebiotic and symbiotic on humeral immunity (IgG titer against ND vaccine) at 9 and 20 days of the study (Mean ± SE)**

Parameter	Days	CON	DA	BS	DA-BS
ELIZA IgG	9 day	2039 ± 21.1 C	2533 ± 19.98 B	2491.80 ± 32.48 B	3918.20 ± 37.84 A
ELIZA IgG	20 day	4120 ± 36.19 D	6447.80 ± 21.42 B	5874.60 ± 23.99 C	7984.80 ± 34.32 A

Different letters represent a significant difference at ( $p \leq 0.05$ ).

A significant ( $P \leq 0.05$ ) difference was recorded for broiler chickens' performance. Live body weights (BW), Body weight gain (WG), Feed intake (FI), and Feed conversion ratio (F.C.R.) were improve in the (DA-BS), (DA), and (BS) groups respectively compare with the (CON) (table 5).

**Table 5: Effect of Probiotic, Prebiotic, and Synbiotic on BW, WG, FI, and FCR at day 35 of the study (Mean ± ES)**

35 days	Treatments			
	CON	DA	BS	DA-BS
BW(gm)	1815 ± 3.1C	1903 ± 2.21B	1952 ± 2.98AB	2092 ± 1.97A
WG (gm)	583 ± 2.8C	604 ± 3.12C	650 ± 3.2B	693 ± 2.85A
FI (gm)	1088 ± 2.44B	1100 ± 3.1B	1201 ± 3.44A	1222 ± 2.45A
FCR	1.87 ± 0.006A	1.82 ± 0.004AB	1.85 ± 0.006 AB	1.76 ± 0.004B

Different letters represent a significant difference at ( $p \leq 0.05$ ).

The decrement of serum cholesterol, triglyceride, LDL and VLDL with an increment of the HDL levels may be probiotic produce short-chain fatty acids (lactic acid and acetic acid) which capable to lower the intracellular PH. Lower PH act to deconjugate of bile salt from lipid in the GIT then decrease lipid absorption and bile reabsorption. Our results are agreement with<sup>22</sup> who reported that *B. subtilis* supplementation led to reduce abdominal fat could be result from decrease of Acetyl-Co A carboxylase enzyme activity of fatty acid synthesis.

Also, the improvement of lipid profile may be attributed to fermented of inulin in the colon by large bowel bacteria resulting in short-chain fatty acids production such as propionate, acetate and butyrate that led to reduce intestinal PH. In addition, Inulin supplement can inhibit the activity of HMG-CoA (hydroxymethylglutaryl-CoA) reductase and modified the gene expression of lipogenic enzyme. In recent studies showed that prebiotic supplementation led to reduce serum cholesterol concentration in chicken after administrated of chicory<sup>23,24</sup>. The cholesterol reduction was observed with the dandelion supplementation may be dandelion have a rich with glycoside, phenolic compound, alkaloids, flavonoid and tannins.

The improvement of immune response and broiler performance may be due to probiotic increase mucin secretion which improve barrier function and competitive exclusion of pathogenic bacteria on receptor sites and availability nutrients. Probiotic enhance lactic acid and acetic acid production antimicrobial substances which capable to lower of the intracellular PH of bacteria leading to the cell death. Probiotic bacteria have exerted an immunomodulatory effect to interact with monocyte/macrophage, dendritic, epithelial and lymphocyte cells.

## CONCLUSION

Adding of the probiotic and the prebiotic as combination (synbiotic) to broiler chicken' basal diet given the higher immune response by enhancing cellular

and humeral immunity. In addition, improving lipid profile, liver enzymes and broiler performance.

**Conflict of Interest:** This research is a personal non-profit work and there is no conflict of interest.

**Source of Funding:** None.

**Ethical Clearance:** Ethical clearance was obtained from the College Scientific Committee (Faculty of Veterinary Medicine, University of Kerbala) to use the poultry chickens in this study for evaluate humeral and cellular immunity, lipid profile, liver enzymes and broiler performance.

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# The Role of Vitamin D Supplementation in Allergic Rhinitis Management

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## ABSTRACT

**Background:** In recent years, the increase in the incidence of allergic diseases worldwide is often associated with vitamin D deficiency. This study aimed to see the effect of additional therapy of vitamin D on the specific immunoglobulin E (IgE) levels of allergic rhinitis patients.

**Materials and Method:** It was an experimental research with pre and post test design group control design. This study involved 40 patients with allergic rhinitis that positive for Der p allergen in skin prick test, divided into 2 groups. Group I was 20 patients receiving intranasal fluticasone spray and vitamin D 2x400IU/day for 21 days. Group II is 20 patients who only get fluticasone intranasal spray therapy for 21 days. Both groups of patients examined the levels of 25(OH)D and specific IgE Der p pre and post therapy.

**Results:** Examination of 25(OH)D and specific IgE Der p was done by enzyme-linked immunosorbent assay (ELISA) method. From the analysis of demographic characteristics of the subjects in each group showed no significant difference ( $p > 0.05$ ) between the two groups based on sex and age of the patient. The results of the Mann-Whitney test showed significant difference ( $p < 0.05$ ) between the two groups, where the specific IgE level decreased more in the vitamin D group than in the non-vitamin D group.

**Conclusion:** There is a significant correlation between changes in levels of 25(OH)D and specific IgE Der p levels of patients with allergic rhinitis, where the increasing levels of 25(OH)D caused decreasing of specific IgE Der p levels.

**Keywords:** Allergic Rhinitis, Vitamin D, 25(OH)D, Specific IgE Der p

## INTRODUCTION

Today, allergic rhinitis is a global health problem that affecting 10-25% of the population worldwide where its prevalence continues to increase.<sup>1,2</sup> In recent years, an increased incidence of allergic diseases worldwide is often associated with vitamin D deficiency.<sup>3</sup> Vitamin D is an essential nutrient that humans acquire through sun exposure, diet and dietary supplements. Ultraviolet

B radiation (UVB) photolysis 7-dehydrocholesterol in the skin to previtamin D<sub>3</sub>, which is then converted to vitamin D<sub>3</sub> (cholecalciferol). Cholecalciferol from the skin and diet will experience hydroxylation in the liver into 25-hydroxyvitamin D<sub>3</sub> (25(OH)D) and stored in the liver. Vitamin D levels are known by measuring serum or plasma levels of 25(OH)D, which is the most widely obtained form in the circulation. The half-life of 25-hydroxyvitamin D is about 3 weeks in circulation. Levels of 1,25-hydroxyvitamin D can be normal or even elevated in vitamin D deficiency states so it can not be used to measure the patient's calciferol status.<sup>5,6</sup>

Vitamin D works by binding to its high affinity receptor. This receptor is known as the Vitamin D Receptor (VDR). The association between calciferol and VDR will stimulate interaction with Retinoic acid X Receptors (RXR) to form heterodimer complex (VDR-

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RXR). This complex bond will then bind to the specific DNA located in the target gene and known as VDRE. The VDR-RXR and VDRE bonding complex will caused gene transcription through the release of co-repressor (SMRT, NCOR) which subsequently withdraws the nuclear receptor co-activation protein.<sup>6,7</sup>

IgE is an antibody that plays a major role in the type I hypersensitivity reaction. Regulatory resistance of IgE occurs through transcriptional mechanism of  $\epsilon$  germline transcription. This process begins with the 25(OH)D binding to its receptor VDR, which then binds to RXR and VDRE on the target genes and forms a heterodimer complex. The target of the gene known as I $\epsilon$  is the area where transcription  $\epsilon$  germline took place. The heterodimer bond complex will then draw the SMRT co-repressors, then draw HDAC1 and HDAC3 to join on I $\epsilon$ . It is now known that the role of HDAC in the body's immune system. HDAC has a role in maintaining the balance of Th1 and Th2. The complex of VDR-RXR-VDRE-co-repressor SMRT-HDAC1 and HDAC3 formed causes DNA chromatin condensation and transcription process  $\epsilon$  germline is inhibited until CSE IgE process does not occur.<sup>8,14</sup>

This study aims to examine the effect of additional therapy of vitamin D on specific IgE Der p levels of patients with allergic rhinitis.

**METHOD**

**Research Site:** This research was conducted in the outpatient unit of ENT department Dr. Wahidin Sudirohusodo hHospital Makassar starting from August 2017 until October 2017. Processing of research result is done at laboratory of Education Hospital of Hasanuddin University Makassar.

**Design and Research Variables:** The design of this study is experimental study with pre test design and post

test control group design. The independent variable in this study was vitamin D, while the dependent variable was specific IgE Der p levels.

**Samples:** The sampling technique was performed randomly. In this study patients that positive with Der p allergen in Skin Prick Test were divided into 2 groups with the number of patients each group was 20 patients, thus total patients as many as 40 people. Patients included in the first group received fluticasone nasal spray and vitamin D 2x400IU oral therapy per day for 21 days, while the second group received only fluticasone nasal spray without vitamin D for 21 days. Patients from both groups were examined for 25(OH)D and specific IgE Der p pre and post therapy.

**Exclusion Criteria:** Having a history of kidney disease, liver, rickets, colorectal carcinoma and mamae, as well as autoimmune diseases such as systemic lupus erythematosus, taking immunomodulators, history of immunotherapy, history of vitamin D consumption in the past 1 month.

**Drugs:** The drug that we used is vitamin D ® GNC VITAMIN D-3 400, with a given dose of 2x400 IU (total of 800 IU/oral/day), given for 21 days (3 weeks).

**Statistical Analysis:** Data were analyzed using Statistical Package for Social Sciences (SPSS) software (version 23.0 for Windows; SPSS Inc, Chicago, IL).

**Research Ethics Aspect:** The study was obtained from Biomedical Research Ethics Committee on Human Faculty of Medicine Universitas Hasanuddin (Register No. 600/H4.8.4.5.31/PP36-KOMETIK/2017).

**RESULTS**

**Characteristics of Population:** Characteristics of the study population were shown in Table 1. The results of the analysis showed no significant difference ( $p > 0.05$ ) between the two groups based on gender and age of the patient.

**Table 1: Demographic Characteristics of Research Subjects in Each Group**

Characteristics	Groups		p
	With Vitamin D (n = 20)	Without Vitamin D (n = 20)	
Age (years)	34,8 ± 10,2	30,8 ± 8,5	0,182*
Gender (M/F)	9/11	10/10	1,000**

\*independent t test; \*\*chi-square test

**Levels of 25(OH)D:** The summary of the analysis of results in Table 2 showed a significant increase of 25(OH)D levels ( $p < 0.05$ ) in the serum group of vitamin D by 13.7%, while in the group without vitamin D actually decreased 5.1% ( $p < 0.05$ ). The results of the Mann-Whitney test showed significant difference between the two groups. Levels of 25(OH) D increased significantly in the group given vitamin D.

**Table 2: Comparison of Changes in 25(OH)D Serum Between the Two Groups**

Groups	Changes of 25(OH)D Serum Levels (ng/mL)				p*
	Pre (Median?)	Post	Changes	Median % of Increasing	
With Vitamin D	14,92 ± 3,40	17,37 ± 2,64	2,46 ± 1,91	13,7% <sup>b</sup>	<0,001
Without Vitamin D	15,26 ± 3,23	14,56 ± 3,63	0,70 ± 0,92	-5,1% <sup>a</sup>	0,005

\*Wilcoxon test; \*\*Mann-Whitney U test if superscript on the median % changes column is the same, it means that Mann Whitney U test results not significantly changes (p>0,05); if different it means significantly difference (p<0,05).

**Immunoglobulin E Specific Der p:** Table 3 shows a significant decrease (p <0.05) at specific IgE Der p levels of serum group vitamin D by 48.7%, while in the group without vitamin D only decreased by 0.81% and not

significant (p > 0.05). The results of the Mann-Whitney test showed significant difference (p <0.05) between the two groups. Specific IgE levels of Der p decreased more in the vitamin D group than in the non-vitamin D group.

**Table 3: Comparison of changes in specific IgE levels Der p between the two groups**

Groups	The Changes of Specific IgE Der p levels (kU/I)				p*
	Pre	Post	Changes	Median % of Decreasing	
With Vitamin D	21,95 ± 15,68	10,72 ± 6,89	-(11,23 ± 12,80)	48,7% <sup>b</sup>	<0,001
Without Vitamin D	17,97 ± 10,07	17,41 ± 9,78	-(0,56 ± 1,17)	0,81% <sup>a</sup>	0,078

\*Wilcoxon test; \*\*Mann-Whitney U test, if superscript median % changes column is the same, it means that the result of Mann Whitney U test not significantly different (p>0,05); if different it means significantly different (p<0,05).

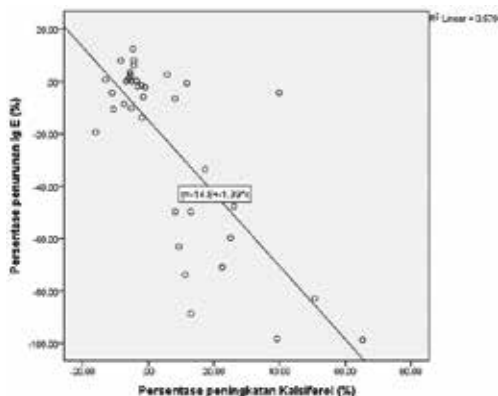
**Relationship Between 25(OH)D With Specific IgE Der p:** The summary results of bivariate correlation analysis (Pearson correlation) and partial correlation in table 4 show

that there was significant correlation (p <0.05) between% serum calciferol level change with% change of specific IgE Der p level with partial correlation coefficient of r = - 0,503.

**Table 4: Correlation between Percentage Changes in Calciferol and IgE Specific Der p**

Correlation between variables	Bivariat Correlation	Partial Correlation
	Correlation Coefficient r dan p	Correlation Coefficient r dan p
% change of klasiferol level with IgE Specific	r = - 0,746 dan p<0,001	r = - 0,503 dan p = 0,001

From graph 1 can be seen the relationship between percentages increased of calciferol with decreased of specific IgE Der p. The more increasing of levels of 25(OH)D, the more decreasing the levels of specific IgE Der p.



**Graph 1: Scatter Plot Graph Between Percentage of 25(OH)D Increasing and Percentage of Specific IgE Der p Decreasing**

**DISCUSSION**

In this study we found insufficiency of 25(OH)D before therapy. Research conducted by Arshi<sup>9</sup> (2012) showed that serum 25(OH)D levels in patients with allergic rhinitis were significantly lower than normal people. This suggests that vitamin D has a role in inflammatory regulation based on type 1 hypersensitivity reactions and mediated by specific IgE. In vitro studies conducted by Pichler<sup>10</sup> (2002) and Staeva-Vieira<sup>11</sup> (2002) demonstrated that IL-4 production would be inhibited by 25(OH)D so that Th2 differentiation would decrease. A study conducted by Penna<sup>12</sup> (2008) found that IL-10 may rise up to 7-fold in dendritic cells given vitamin D, high levels of IL-10 prevent mast cell degranulation.

Most of the research sample work is office workers, students and housewives who are more in the room, causing a lack of exposure to ultraviolet light. This



may lead to low 25(OH)D levels in both groups. After therapy, there was an increase in serum 25(OH)D levels in the first group by 13.7%. While in the group not given vitamin D found a decrease in serum 25(OH)D level of 5.1%. This shows a significant difference of change between the two groups.

From the observation of specific IgE Der p, there was a significant decrease in specific IgE Der p levels in serum by 48.7% in the first group given vitamin D supplementation. While in the group not given vitamin D there was also a decrease of 0.81 % but not meaningful. Research conducted by Milovanovic<sup>8</sup> (2011) suggests that vitamin D has a major role in inhibiting IgE regulation through transcriptional  $\epsilon$  germline barrier mechanisms.

In this study, bivariate correlation (Pearson correlation) and partial correlation found significant correlation between percentage change of serum vitamin D levels with percentage change of specific IgE levels which found that the higher the increasing of serum vitamin D level, the lower the specific IgE level. This is in contrast to the results of a study conducted by Tamasauskienė<sup>13</sup> (2014) which states that there is no significant correlation between total IgE levels and vitamin D serum levels.

The limitations of this study are that specific IgE constraints may also be caused by IFN $\gamma$ , BCR, CTLA4, and IL-21. In this study these factors are not examined. Research done by examining the above cytokines can clarify the relationship between 25(OH)D serum and specific IgE. In this study additional vitamin D therapy was given for 21 days. Same with research conducted by Modh<sup>3</sup> (2014) which also provides vitamin D supplement for 21 days. Until now, it has not been known how long period of effective intake of vitamin D that can significantly decreasing specific IgE levels. More research is needed on this subject.

## CONCLUSIONS

Through this study it can be concluded that there is a significant relationship between specific IgE of Der p levels with 25(OH)D serum levels, whereas the higher levels of 25(OH)D, the lower the specific IgE Der p levels. In this study it can also be concluded that the addition of vitamin D supplementation may decrease the specific IgE Der p level of patients with allergic rhinitis.

## RECOMMENDATION

Due to the limitations in this study, further research is needed to clarify the relationship between vitamin D and specific IgE.

**Conflict of Interest:** There is no conflict of interest

**Source of Funding:** Researcher (Self)

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# A Relationship between Knowledge, Attitude, and Practice about Balanced Nutrition Guidelines and Metabolic Syndrome among Central Obese Teachers in Makassar

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## ABSTRACT

Metabolic Syndrome prevalence increase included in the Asia Pacific. This study aimed to assess a relationship between knowledge, attitude, and practices about balanced nutrition guidelines and metabolic syndrome (Mets) in high school teacher with central obese. This was a cross-sectional study conducted in twelve high schools in Makassar city. Subjects were 129 teachers (28 men and 101 women) diagnosed with central obese. Knowledge, attitude, and practice (KAP) assessed by a validated questionnaire. Mets was defined by measuring blood glucose, blood pressure, HDL, triglycerides, and waist circumference. Those fulfilled three parameters or above were stated as Mets group, and others were stated as Risk group. KAP was categorized according to score and divided into low (Q1), moderate (Q2), and high (Q3). Chi-square test was used to assess the relationship. Subjects were mostly women (78,3%), Buginese ethnic (66,7%), and married (96,1%). KAP was distributed evenly to three categories for each variable. The relationship between Knowledge and Mets was borderline significant ( $p=0.093$ ). There were not significantly different between attitude and Mets ( $p=0.406$ ). However, there were significantly different between practice and Mets ( $p=0.016$ ). These adequate knowledge and practice were higher in Mets group compared to Risk group. This study also showed some practices of balanced nutrition guidelines were very low whereas adequate consumption of vegetables and fruits (0.8%), adequate consumption of protein (25.6%), less consume a variety of staple foods (6.2%), less consumption of sweet, salty and fatty foods (2,3%), reading labels on food packaging (32,8%), and perform adequate physical activity and maintain a normal weight (28,2%). We conclude that the teacher in Mets group showed better knowledge and practice of balanced nutrition guidelines compared to Risk group.

**Keywords:** *Non-communicable diseases, developing countries, vegetables, and fruits.*

## INTRODUCTION

Metabolic syndrome is a collection of metabolic disorders that can increase the risk of non-communicable diseases including heart disease and diabetes mellitus.<sup>1</sup> Metabolic disorders that including increasing fasting blood sugar, decreases HDL levels, increasing triglyceride levels, hypertension and central obesity,

which having at least 3 of these parameters called Mets.<sup>2</sup> Data shows that there is an increase in the prevalence of Mets where 20-30% was an adult groups.<sup>3</sup>

Knowledge, attitudes and practices about nutrition that are lacking are the causes of the increasing risk of non-communicable diseases.<sup>4,5</sup> Knowledge is important in determining which foods will be chosen for consumption which will have an impact on health. Practicing proper nutrition can have a positive impact on various blood metabolic parameters.<sup>6,7</sup>

Balanced nutrition guidelines are a government effort to overcome various nutritional problems in Indonesia.<sup>8</sup> This guide contains 10 main messages, including messages related to food and the practice of

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clean and healthy living. The application of balanced nutrition messages is expected to be able to prevent an increase in non-communicable diseases in Indonesia.

South Sulawesi is the province with the highest prevalence of stroke in Indonesia where the main risk factor is Mets.<sup>9</sup> The study of the metabolic syndrome in Indonesia is still very little. Research on knowledge, attitudes and practices of balanced nutrition towards the metabolic syndrome has not been widely performed. This research will contribute to the provision of information, especially about the knowledge, attitudes and practices of balanced nutrition guidelines issued by the Indonesian Ministry of Health related metabolic syndrome in obese secondary school teachers in Makassar.<sup>8</sup>

## MATERIALS AND METHOD

**Research design:** This was a cross sectional study design conducted in 12 secondary schools in the Makassar city. Of these, 386 people interviewed and measured their anthropometry (weight, height, waist circumference) for central obesity screening. As a result, 229 teachers experienced central obesity (59.3%). Only 151 teachers were willing to take blood ( $n = 72$  negative responses). For analysis, we excluded samples who had been diagnosed with heart disease and diabetes mellitus ( $n = 22$  people). The total number of samples we analyzed were 129 teachers (28 men and 101 women).

Knowledge, attitude and practice measure by validated questionnaire. Knowledge questionnaire ( $r = 0.790$ ), attitude ( $r = 0.737$ ), and practice ( $r = 0.769$ ). Data was taken by nutrition students in Hasanuddin University Faculty of Public Health.

**Metabolic Syndrome:** Metabolic syndrome is defined by a joint interim of International Diabetes Federation Task Force on Epidemiology and prevention; National Heart, Lung and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International association for the Study of Obesity.<sup>1</sup> According to this definition, triglyceride levels  $\geq 150$  mg/dl, HDL  $< 40$  mg/dl for men and  $< 50$  mg/dl for women, fasting blood sugar  $\geq 100$  mg/dl, blood pressure  $\geq 130/85$  mmHg is said to be greater risk. Central obesity is determined by Asian ethnicity which is risky if  $\geq 90$  cm in men and  $\geq 80$  cm in women. Having 3 of this parameters categorized as metabolic syndrome group and other stated as risk group. Abdominal circumference is measured using the waist

ruler of one Med Brand. Blood pressure is measured by using mercury tensiometer. HDL examination using homogenous enzymatic colorimetric assay method, triglyceride examination using enzymatic colorimetric, fasting blood glucose examination by HK method (Hexokinase).

The study was conducted in compliance with the Declaration of Helsinki. All of the procedures involving human subjects were approved by the Medical Ethics Research Board of Hasanuddin University (No. UH 1611123). Written consent was obtained from the participants before the study began.

Data analysis was performed using SPSS version 17. Descriptive analysis was conducted to describe the demographic condition of respondents, and bivariate analysis, to see the relationship between knowledge, attitudes and practice of balanced nutrition with metabolic syndrome.

## RESULTS

There were 129 teachers who became respondents in this study. Most (78.3%) of respondents are women, and included in the bugis ethnicity (66,7%). Majority (92.4%) of respondents are Muslim with education was S1/S2/S3 (81.4%) and most (96.2%) of respondents had married status.

Table 1 shows the relationship between knowledge, attitudes and balanced nutrition practices with Mets. From table, it can be seen that there is a significant relationship between balanced nutrition practices and metabolic syndrome. ( $p = 0.016$ ). Respondents who have high balanced nutrition practices experience more of the metabolic syndrome than those who have less practice (46.2% and 23.4%). Knowledge has a borderline relationship with the metabolic syndrome ( $p = 0.093$ ) and there is no significant relationship with the metabolic syndrome ( $p = 0.406$ ).

Table 2 shows that there are several messages of balanced nutrition guidelines which are still very poor practice, namely eat a plenty of vegetables and fruits (0.8%); adequate consumption of protein (25.6%); less consume a variety of staple foods (6,2%); less consumption of sweet, salty and fatty foods (2,3%); reading labels on food packaging (32,8%), and perform adequate physical activity and maintain a normal weight (28,2%). Knowledge and attitudes in all balanced nutrition guidelines are good ( $>60\%$ ).

**Table 1: Relationship between knowledge, attitudes, practice of Balanced Nutrition Practices and METS**

Variable	Metabolic syndrome (n = 52)		Risk Metabolic syndrome (n = 79)		p-value
	n	%	n	%	
<b>Knowledge</b>					
Low	15	35.7	27	64.3	0.093
Moderate	11	28.9	27	71.1	
High	25	51.0	24	49.0	
<b>Attitude</b>					
Low	20	45.5	24	54.5	0.406
Moderate	17	41.5	24	58.5	
High	14	31.8	30	68.2	
<b>Practice</b>					
Low	11	23.4	36	76.6	0.016
Moderate	22	51.2	21	48.8	
High	18	46.2	21	53.8	

**Table 2: The correct answer from the components of Knowledge, attitudes, and balanced nutrition practices**

Variable	Knowledge (n = 129)		Attitude (n = 129)		Practice (n = 129)	
	n	%	n	%	n	%
Be grateful and eat wide variety of foods	83	64.3	79	61.2	120	93.0
Eat a plenty of vegetables and fruits	121	93.8	101	78.3	1	0.8
Adequate consumption of protein	85	65.9	95	73.6	33	25.6
Get used to consume a variety of staple foods	97	75.2	99	76.7	6	6.2
Limit intake of sweet, salty, and fatty foods	96	74.4	89	69.0	3	2.3
Get used to breakfast	47	36.4	126	97.7	73	56.6
Get used to drink enough water and safe	77	59.7	105	81.4	91	70.5
Get used to reading labels on food packaging	81	62.8	117	90.7	42	32.8
Wash your hands with soap and running water	121	93.8	110	85.3	95	73.6
Perform adequate physical activity and maintain a normal weight	111	86.0	104	80.6	36	28.2

**DISCUSSIONS**

Balanced nutrition practices have a significant relationship with incident of metabolic syndrome, while knowledge has a borderline relationship with the metabolic syndrome, and attitude was not significant related with incident of metabolic syndrome among Respondents. This research was conducted in a group of adults whose work was teacher. This group majority of education was quite high (S1/S2/S3 = 96.9%). Having higher education is related to high knowledge about health.<sup>10,11</sup>

Respondents having metabolic syndrome have high practice of balanced nutrition guidelines. Some respondents who are experiencing pain aware and

willing to change their lifestyle, including in eating and physical activity.<sup>12</sup> This study was conducted in a group of teachers who have been detected as having central obesity so that balanced nutrition practices have mostly been carried out, although they have not shown positive results in the parameters of the metabolic syndrome.

This study has similarity result with a study conducted by O’Brien and Davis in Ireland. They found no relationship between knowledge and BMI. People who have obese have better knowledge of choosing food than people with normal BMI. This shows that knowledge is important, but does not directly affect behavior change.<sup>13</sup>

Balanced nutrition guidelines prepared by the Indonesian Ministry of Health in 2014 in an effort to reduce the prevalence of NCDs in Indonesia. This guide consists of 10 balanced nutrition messages namely be grateful and eat wide variety of nutritious foods; eat plenty of vegetables and fruits; get used to take side dishes that contain high protein; get used to consume a variety of staple foods; limit intake of sweet, salty and fatty foods; get used to breakfast; get used to drink enough water and safe; get used to reading labels on food packaging; wash your hands with soapy water and running water; perform adequate physical activity and maintain a normal weight.<sup>8</sup>

Balanced nutrition practice on each message is still very lacking. The habit of eating vegetables and fruit is quite the lowest practice. Consumption of 3 servings of vegetables and 2 servings of fruit a day is a sufficient condition in the message of balanced nutrition. Increasing consumption of vegetables and fruit can reduce the risk of various NCDs.<sup>14</sup> Eating unhealthy food is often done at work, including in the group of teachers.<sup>15</sup>

Another message that is still very lacking in practice is limiting the consumption of sweet, salty and fatty foods. Consumption of sweet, salty and fatty foods is associated with increased risk NCDs.<sup>16</sup> Our respondents was almost women that have preferred sweet foods.<sup>17</sup>

## CONCLUSIONS

This study show metabolic syndrome related with practice of balanced nutrition guidelines. The results of this study can be used as a basic for developing educational media that emphasize balanced nutrition practices.

**Conflict of Interest:** There is no any conflict of interest within this study and publication

**Ethical Clearance:** Taken from Hasanuddin University Ethics Committee with number: 869/H4.8.4.5.31/PP36-KOMETIK/2017.

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# Effective Audio Visual Aids Change the Behavior of Elementary School Students in Maintaining Dental and Mouth Health in Makassar City

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## ABSTRACT

Audio Visual Aids (AVA) is one of the things that needs to be considered in conducting health promotion. Media commonly used in health promotion is audio aids, visual aids and audio-visual aids. This research was conducted with a quantitative approach, namely quasi experimental with randomized method design of two groups design by using purposive sampling method which is a design that reveals the effect of cause and effect by involving the experimental group, but the selection of the two groups is not by random technique. The population in this study were all grade IV elementary school students in SD InpresLanraki I as many as 57 students, and SD InpresTamalanrea VI as many as 33 students. So that the total population is 90 students, no sampling is taken in this study so that it is called Total Sampling. The results of this study using the Wilcoxon test found that audio visual aids was effective against changes in knowledge, attitudes and actions of elementary school students in maintaining dental and oral health ( $p$  value  $<0.005$ ). While visual aids like posters affect the changes in students' knowledge and attitudes, but are not effective in changing the behavior of elementary school students in maintaining dental and oral health ( $p$  value  $> 0.005$ ). Extension needs to be done by using audio visual aids such as videos so that students' knowledge of the importance of oral and dental health increases, and can change students' attitudes and actions in maintaining better oral and dental health.

**Keywords:** Effectiveness, Audio Visual Aids, Posters, Behavior, Teeth and Mouth

## INTRODUCTION

Oral and dental health is important in the lives of every individual, including children, because damaged and untreated teeth and gums cause pain, masticatory disorders, and can interfere with other body health. Dental and oral problems in children can also affect the growth and development of children.<sup>[1]</sup>

The source of dental health problems is generally closely related to the behavior of maintaining dental and

oral hygiene. Poor behavior in maintaining dental and oral hygiene will increase the risk of plaque formation on the tooth surface which can cause caries and periodontal disease. To change bad behavior, one of them is by intervening through education.<sup>[2], [3]</sup>

Media is one of the things that need to be considered in conducting health promotion. Media commonly used in health promotion is audio media, visual media and audio-visual media. Audio visual media is a good medium to use, because the media involves more senses in the learning process.

According to the 2007 and 2013 Basic Health Research (Riskesdas), dental and oral health problems increased from 23.2% to 25.9%. From residents who have dental and oral health, the percentage of the population receiving dental care increased from 29.7% in 2007 to 31.1% in 2013.<sup>[4], [5]</sup>

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Based on provincial data that has a high dental and oral health problem (> 35%) is South Sulawesi Province when compared with other provinces in Indonesia, where in 2007 as many as 25.3% increased in 2013 to 36.2%.<sup>[6]</sup>

According to profile data from the Makassar City Health Office in 2017 among 14 sub-districts in Makassar City, Subdistricts with SD/MI needing dental and oral health care were in the working area of the Makassar City Tamalanrea Health Center with 2,165 students divided into 895 male students - male and 1,270 female students.

Based on data obtained from the Tamalanrea City Health Center in Makassar in 2018 there were 15 elementary schools in the working area of the Tamalanrea health center in the city of Makassar. Among the 15 elementary schools there were 3 elementary schools that had dental and oral health problems, namely SD InpresLanraki I as many as 31 which were decayed missing filling tooth and 114 defective decayed exfoliated filling teeth, SD InpresTamalanrea VI as many as 15 DMF-T (decayed missing filling tooth) and 92 def-T (decayed exfoliated filling tooth), and SD InpresTamalanrea V of 21 DMF-T (decayed missing filling tooth) and 87 which are def-T (decayed exfoliated filling tooth).<sup>[7]</sup>

Based on the previous description, it is necessary to conduct research on the effectiveness of audio visual aids on the behavior of elementary school children in maintaining dental and mouth health problems in the working area of the Tamalanrea Health Center.

## METHOD

The type of research used was quasi-experiment with a pretest-posttest design only control group design, namely research by giving treatment (intervention) to the experimental group by comparing with the control group.<sup>[8],[9]</sup> In this study, the experimental group received education with audio visual aids, while the control group was given visual aids education in the form of posters. Before the intervention, the pretest was performed in both groups. After giving the intervention, posttest was then carried out. This study uses questionnaires, namely data collection techniques that are carried out by giving a set of questions or statements written to the respondent to answer by sharing with each respondent at the pretest and posttest. Data collected through observation and interview. The population in this study were all grade IV

elementary school students in SD InpresLanraki I as many as 57 students, and SD InpresTamalanrea IV as many as 33 students. So that the total population is 90 students, no sampling is taken in this study so that it is called Total Sampling. Data analysis used Wilcoxon test because the distribution of data is not normally distributed.

To simplify the research process, the researcher presents a series of activities during the research process, namely: Preparation Phase, namely determining and making a research schedule, determining the research assistant and preparing the material. Implementation phase. In the initial stages of the implementation, first open the greeting, do the introductory stage, open the class with prayers led by the class leader, and attend the attendees and those who are unable to attend, and the researcher explains the purpose of arrival, purpose, topic and description about the material that will be brought.

Health Education Steps through audio visual aids, namely preparing material and supporting media, this material can be in the form of videos that contain the meaning of invitation and appeal, provide pre-test, explain the purpose and topic of the meeting to the respondent, provide health information in the form of health messages in audiovisual form related to the material importance of maintaining dental and oral health. Performed for 1 week given at regular intervals every day. The final stage was to post-test by distributing the same questionnaire during the pre-test with the aim of finding out whether there was a change in students' knowledge, attitudes and actions before and after the health education intervention was provided through audio visual aids.

Educational steps through visual media in the form of posters, namely preparing material and supporting media, giving pre-tests, explaining the objectives and topics of the meeting to the respondents, distributing posters to each respondent with the help of research assistants and ensuring the posters are evenly distributed, read back the contents posters that have been shared and suggest to the respondent to listen, pay attention and understand the contents of the poster and hope for changes in knowledge, attitudes and actions after reading the poster. The final stage was to post-test by distributing the same questionnaire during the pre-test with the aim of finding out whether there was a change in students' knowledge, attitudes and actions before and after health education interventions were given through visual aids.

The Final Stage of this Implementation is to evaluate the results by checking respondents' answers, scoring data, tabulating research data and concluding how the level of knowledge, attitudes and actions of students before and after being given health education through audio visual aids and visual aids.

## RESULTS

The results of this study were carried out in two primary schools within the working area of the Makassar City Tamalanrea health center, the results of data analysis were presented in table form accompanied by the following narrative:

**Table 1: Distribution of Respondents Based on Age and Gender Characteristics in Makassar City**

Variable	Elementary School			
	Lanraki I (N = 57)		Tamalanrea VI (N = 33)	
	n	%	n	%
<b>Age</b>				
8	3	5,3	1	3,0
9	34	59,6	25	75,8
10	17	29,8	7	21,2
11	2	3,5	0	0
12	1	1,8	0	0
<b>Gender</b>				
Male	30	52,6	19	57,6
Female	27	47,4	14	42,4

**Table 2: Distribution of Respondents Based on Knowledge Levels, Attitudes and Actions of Primary School Students When Pre Test and Post Test With Education Through Audio Visual Aids and Visual Aids in Makassar City**

Variabel	Pre Test				Post Test				P value
	Less/Negative		Enough/Positive		Less/Negative		Enough/Positive		
	n	%	n	%	n	%	n	%	
<b>Knowledge</b>									
Audio Visual Aids	14	25,0	43	75,0	0	0	57	100	0,000
Visual Aids	4	12,0	29	87,0	1	3,0	32	97,0	0,000
<b>Attitudes</b>									
Audio Visual Aids	3	5,3	54	94,7	0	0	57	100	0,000
Visual Aids	1	3,0	32	97,0	0	0	33	100	0,000
<b>Actions</b>									
Audio Visual Aids	2	3,5	55	96,5	0	0	57	100	0,000
Visual Aids	3	9,1	30	91,9	2	6,1	31	93,9	0,369

## DISCUSSION

**Audio Visual Aids:** Audio Visual Aids is an audio visual media that displays images and sounds. The message presented can be either facts (events, important events, news) or fictitious (such as stories), can be informative, educative or instructional.

The results of this study indicate that during the pre-test the majority of behaviors (knowledge, attitudes, and actions) of students in both groups were good enough to maintain oral and dental health, judging from the percentage of knowledge, attitudes and actions that included enough/positive categories between 75%-97%. This shows that students know how to maintain

dental and oral health. When the post-test knowledge, attitudes and actions of students experienced an increase of between 93.9% -100%. So that there is the influence of the use of educational media in changing knowledge, attitudes and actions of students.

The results of this study indicate that in the group given audio visual aids intervention p value was 0,000, which means that audio visual aids effectively changes the knowledge, attitudes and actions of elementary school students in maintaining oral and dental health.

This research is in line with the study of Prasko et al (2016) on counseling on audio visual methods and demonstrations on the knowledge of brushing teeth in elementary school children with the results of statistical tests with Paired Ttest obtained p.value = 0,000. this situation shows that Ho is rejected and Ha is accepted, there is a significant difference in changes in knowledge level before and after the group of respondents who were given counseling with audio visual. Students' knowledge is increasing because the audio visual method is very interesting and audio-visual media presents learning materials using teaching media tools that can play, or demonstrate these materials so that students can watch firsthand, watching closely.<sup>[10]</sup> This is also in line with research that says that there is a significant increase in the pre-test results measured by the level of knowledge, attitudes and actions to the post-test scores, which means that the PKG uses video media to improve children's level of knowledge, attitudes and actions in maintaining teeth and mouth health.<sup>[11],[12],[13],[14],[15],[16],[17],[18]</sup>

The same study was showed that health education about personal hygiene with video media had an influence on personal hygiene knowledge, attitudes and action of elementary students.<sup>[19]</sup>

**Visual Aids:** Media posters are a form of visual media in print that contains messages, which are usually posted on walls, in public places, or public transportation.

The results of this study indicate that the majority of behavior (knowledge, attitudes, and actions) of students are good enough. The results of this study indicate that the control group obtained p value 0,000 for the variable knowledge and attitudes of students which means the media poster effectively changes the knowledge and attitudes of elementary school students in maintaining dental and oral health.

The results of the same study also showed that poster media had an effect on increasing knowledge, attitudes and intentions, but showed no influence with actions in maintaining dental and oral health.<sup>[20],[21],[22],[23],[24],[25],[26],[27],[28]</sup>

In the control group obtained p value 0.369, which means that there is no effect on the use of visual media such as posters on changes in the actions of elementary school children in maintaining dental and oral health in the working area of the tamalanrea health center in 2018.

## CONCLUSION/RECOMMENDATION

Education through Audio Visual Aids is more effective than Visual Aids in improving the knowledge, attitudes and actions of elementary school children in maintaining oral health. So it is necessary to disseminate health information by providing health education through counseling directly to schools about maintaining dental and oral health by using appropriate educational media and delivering it in an interesting manner.

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# The Impact of Marketing Information Systems on Brilliant Financial Performance in Hospital Industry

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## ABSTRACT

During the past few years, there have been tremendous attempts among various organizations to implement the marketing information systems to improve their financial performance, in general, information systems are an important element to support the performance, however, to apply these systems it is necessary to be analyzed and evaluated. Accordingly, The aim of this paper is to identify the impact of marketing information systems directly on brilliant financial performance, after a brief literature review an applied study was conducted among physicians that work in private hospitals in Iraq. To this end a model of the relations has been developed to be tested by linear regression and structural equation modeling, the results showed that marketing information systems directly affect the brilliant financial performance.

**Keywords:** Internal Records, Marketing Decision Support System, Marketing intelligence, Marketing Research.

## INTRODUCTION

Iraq has gone through decades of war and substantial sanctions from the United Nations. For example, power outages as a result of the Gulf War in the 1990s and a decade of sanctions were among the side effects on hospitals <sup>1</sup>. After decades of war tension and fear of the unknown <sup>2</sup>. The fight against terrorism has had a major impact on the health sector, the facility needs adequate resources to carry out its functions <sup>3</sup>. These circumstances affected the provision of logistical and financial capabilities; therefore, the private healthcare sector emerged as a competitive alternative, And is looking for strategic tools to ensure the achievement of financial performance.

The marketing decisions that must be taken within any organization give a wide range of marketing areas,

starting with the consumer and the target market sectors, through the marketing mix <sup>4</sup>, as well as the decisions related to organizing the marketing performance and controlling the products of its business. Such decisions need to collect multiple, comprehensive and renewable data on the environment and the variables that affect it <sup>5</sup>. Therefore, the process of collecting information should be a continuous process according to a specific system, which led the organizations to establish the information system as a necessary tools to take effective marketing decisions in light of the development of organizations, especially health organizations, therefore, the importance of the information system has increased<sup>6</sup>, and the information has become a strategic resource depends on the decision-maker. Today, information systems are reshaping the rules of action on which organizations are based in the past <sup>7</sup>. There is no aspect of the organization's work that has not been affected by information technology, so the study of information systems has become like studying any other functional area such as production, marketing and finance. Accordingly, it is clear that there is a need to fill gaps in knowledge, and to identify these strategic tools and their effects. To this end, this study aims to identify the impact of marketing information systems on the brilliant financial performance.

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## LITERATURE REVIEW

**Marketing Information Systems:** The marketing information system (SIM) can be defined as a set of structured relationships, where individuals, machines, and procedures intervene, and whose purpose is to generate an orderly flow of pertinent information, coming from internal and external sources. external to the organization, intended to serve as a basis for decisions within the specific areas of marketing responsibility<sup>8</sup>. Information systems have become an essential part of the success of modern organizations and center for decision-making so that it can achieve its objectives.

**Internal records:** The internal records and reports of the organization provide many of the information required for the planning, implementation and control process<sup>9</sup>. The sales data for different regions, customers and products are of great importance to the marketing manager, whether in assessing the performance of those areas or products<sup>10</sup>. The sales representatives usually prepare periodic reports on the reactions of competitors in the market to the work of the organization to prepare periodic reports on the reactions of customers with complaints and satisfaction about the performance of services<sup>11</sup>.

**Marketing decision support system:** Marketing decision support systems have emerged as a result of the growth and expansion of organizations to help marketing managers improve their capabilities, including a computer system that facilitates procedures for the marketing manager to access information in decision making<sup>12</sup>. It is defined as an internal activity and a computerized and flexible information system that enables managers to obtain the information necessary to make marketing decisions<sup>13</sup>. The system includes a set of software, statistical tools, decision templates and programs designed to assist marketing managers.

**Marketing intelligence:** The marketing intelligence system consists of a set of procedures and resources used by managers to obtain daily information of changes in the marketing environment<sup>14</sup>.

Marketing intelligence is defined as the confidential information that marketing management collects from competitors in the market<sup>10</sup>. In the light of this information, the organization adjusts its marketing plans and programs, and the importance of this information increases as competition increases.

**Marketing research:** Marketing research is used to provide information that makes it possible to make decisions that are irregular and reflect problems that the organization faces from time to time, or decisions that need to collect information to help it, such as introducing a new product to the market (which connects consumers

and customers to the decision maker)<sup>15</sup>. Marketing research is defined as the collection and recording of marketing data or data relating to the marketing problems of goods and services. These problems may relate to any component of the marketing mix<sup>16</sup>. Marketing research activity is related to data collection, analysis and analysis of marketing problems itself.

**Brilliant Financial Performance:** Financial performance is the most important part of the organization's control, linking the cause to the effect, such as the various activities to the reduction of costs, as the main influence of organizations, as results not only for financial purposes but for quantitative performance<sup>17</sup>. Financial performance is defined as a set of financial instruments that help determine the actual status of the organization's performance, by measuring profitability and liquidity<sup>18</sup>. Brilliant performance represents the level of excellence achieved in management by providing leadership and innovation by focusing on implicit knowledge management<sup>19</sup>. Hence, the organization is able to cope with changes in the external environment, This will achieve brilliant financial performance, this term has recently developed to express the organization's ability on adapting the current situation and determining the strategic position by reducing costs, increasing profitability and providing different alternatives to liquidity<sup>20</sup>. This is related to the creative and innovative capabilities that are employed within the organization.

Liquidity refers to the ability of the organization to maintain a portion of its investment assets in the form of liquid cash, and easy cash deposits<sup>21</sup>. Profitability is defined as the relationship between profits achieved by the company and investments, it is a key objective for all companies and investors, and important tool for measuring the efficiency of management<sup>18</sup>.

## MATERIAL AND METHOD

**Measurement instrument:** For the development of the research, a semi-structured survey was used, consisting of 28 questions divided into 3 different sections the first one about the demographic profile and the second one about the use of marketing Information Systems (MIS), among which are: internal records (IR), marketing decision support system (MD), marketing intelligence (MI), marketing research (MR), the other section is about brilliant financial performance (BFP) with profitability and (PR), liquidity (LQ) as dependent variable.

We considered the frequency of 5-scale measurement, through (scale of 1-5), the data obtained from a questionnaire and checked the validity and analyzed in an analytical way to observe the relationship between variables.

### MODEL

With the data obtained, a simple and multiple linear regression model was made through the ordinary least squares method, which are presented in Figure 1. Likewise, it is presented in regression equation, the model was estimated using ordinary minimums, with PLS and structural equation modeling. The analysis carried out for the model focused on the use of a statistic called P-value, which corresponds to the probability of accepting the null hypothesis, compared to the level of significance ( $\alpha=0.05$  was used).

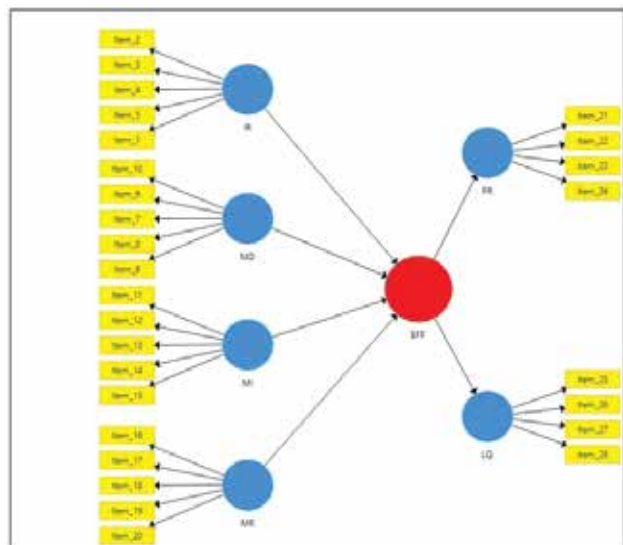


Figure 1: Study Model

**Validation Tests:** The validation tests conducted on the data represented on the questionnaire is valid. The test focused on validating whether or not the data used was valid, whereby the test used was whole numeric. In essence, the results obtained ascribed that the data was valid, The validity of the questionnaire was evaluated and approved by experts, and reliability was reported at Cronbach alpha, which need to be above (0.70) <sup>22</sup>, accordingly, the result shows accepting values as it shown in Table 1.

Table 1: Reliability and Validity Results

Scale	Factor	Cronbach's Alpha
MIS	IR	0.861
	MD	0.811
	MI	0.724
	MR	0.833
BFP	PR	0.844
	LQ	0.809
All		0.841

### RESULTS

**Factor Analysis:** The validation of the theoretical constructs of the MIS model and BFP is analyzed using a

factor analysis, with a varimax rotation. As seen in Table 2, the factor analysis indicates that all MIS factors can be grouped into four main components with 20 factors and BFP factors can be grouped into two main components with 8 factors. Each factor confirms the constructs of the theoretical models of the authors.

Table 2: Analysis of Component

	MIS				BFP	
	IR	MD	MI	MR	PR	LQ
1	0.774				0.892	
2	0.755				0.868	
3	0.731				0.608	
4	0.715				0.526	
5	0.699					0.419
6		0.857				0.439
7		0.837				0.906
8		0.813				0.900
9		0.492				
10		0.490				
11			0.747			
12			0.698			
13			0.634			
14			0.416			
15			0.409			
16				0.812		
17				0.720		
18				0.706		
19				0.558		
20				0.519		

### Hypotheses Testing

**Hypothesis 1:** Table 3 shows that there is a correlation between the two variables (MIS, BFP), this relationship is positive and high, and the correlation coefficient is 0.770 and it is significant according to the value of (Sig<0.05) and the value of T statistic which is also acceptable value. This results supports hypothesis 1. As for the dimension, the relationship between (IR,BFP) is positive and high with correlation coefficient is 0.729 and this relationship is significant according to the value of (Sig<0.05) and the value of T statistic which was accepted. This results supports Sub-Hypothesis 1. Regarding the relationship between (MD,BFP) it appeared positive and high correlation with value of 0.624 and this relationship is significant according to the value of (Sig<0.05) and T statistic which was accepted. These results supports Sub-Hypothesis 2. And it can be noticed that the correlation between (MI,BFP) is strong and positive with value of 0.663, and the significance of this correlation revealed through T test and significance

level (Sig<0.05) These results support the Hypothesis 3. While the relation between (MR,BFP) refer to positive and strong relationship with value of 0.530 and this relationship is significant according to the value of (Sig<0.05) and T statistic which was accepted. These results supports Sub-Hypothesis 4.

**Table 3: Correlation Coefficient Results**

Relation	r	T	Sig
IR <...> BFP	0.729**	8.044	0.000
MD <...> BFP	0.624**	6.034	0.000
MI <...> BFP	0.663**	6.695	0.000
MR <...> BFP	0.530**	5.005	0.000
MIS <...> BFP	0.770**	9.105	0.000

**Hypothesis 2:** In order to contrast the hypotheses proposed in this paper, the following research models is considered:  $Y_i = b_0 + b_1 IR + b_2 MD + b_3 MI + b_4 MR$ . And it can be calculated by simple and multiple regression. Table 4 indicates that marketing information system has positive and significant impact for all performance models based on regression coefficients IR (0.601\*\*\*), MD (0.526\*\*\*), MI (0.462 \*\*), MR (0.463 \*\*\*) and overall performance (0.732 \*\*\*). This indicates that the marketing information system generates higher financial performance in hospital industry. Regarding the global validity of the models, validity is found for those in which the values of the F were significant; this being the case of (IR(F = 64.711 \*), MD(F = 36.407 \*\*), MI(F= 44.824 \*\*\*), MR(F= 25.047 \*\*\*) and MIS(F= 82.906 \*\*\*)). Also Table 5 ,Figure 2 refer to the results of the estimates made on the relationships between the four dimensions of marketing information system (IR,MD,MI,MR) and brilliant financial performance. Estimates were obtained from multivariate linear regressions by PLS. Initially, it was found in all the models that there are two significant relations with the dimensions (IR,MD), which has (B1=0.511\*\*\*, P=0.000, B2=0.379\*\*\*, P=0.000), with two not significant relations with the dimensions (MD,MI), which indicates that with multiple regression MI and MR will have no significant effect on BFP. These results support H2,H21,H22.

**Table 4: Regression Results**

Relation	b0	b1	R2	Adj-R2	F	Sig
IR ....> BFP	1.815	0.601	0.532	0.523	64.711	0.000
MD ....> BFP	2.122	0.526	0.390	0.379	36.407	0.000
MI ....> BFP	2.426	0.462	0.440	0.430	44.824	0.000
MR ....> BFP	2.450	0.463	0.305	0.293	25.047	0.000
MIS ....> BFP	1.195	0.732	0.593	0.585	82.906	0.000

**Table 5: Multiple Regression Results**

Relation	Path	Mean	S.D	T	Sig
IR ....> BFP	0.511	0.521	0.064	8.028	0.000
MD ....> BFP	0.379	0.384	0.093	4.093	0.000
MI ....> BFP	0.115	0.105	0.086	1.339	0.181
MR ....> BFP	0.088	0.067	0.063	1.398	0.163



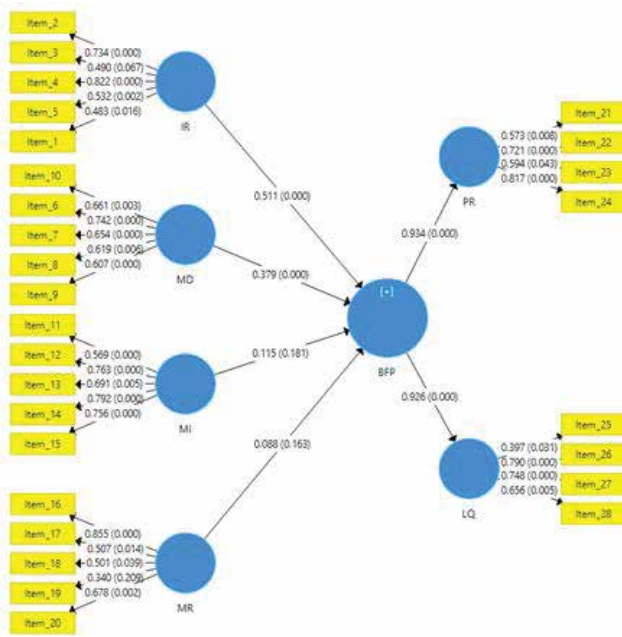


Figure 2 : Structural Effect

## DISCUSSION AND CONCLUSION

Health services are one of the most important services that the individual in society is looking for, and wanted with a certain degree of excellence and thoroughness. This is mainly due to several reasons primarily related to abundance, diversity and ambiguity of organic and psychological diseases that human exposed and suffered from in modern times<sup>3</sup>. Thus, modern health institutions are giving this subject a great interest in a competitive environment which make it necessary to search for sources in which to succeed in the competitive field<sup>23</sup>, so organizations seek to find a marketing system that contributes to high levels of marketing performance that enables to compete and improve financial performance<sup>24</sup>.

The results showed that the marketing information systems affect the financial performance. The results indicated that the effectiveness of the marketing information system will lead to an increase in the brilliant financial performance indicators both profitability and liquidity. These results are consistent with the study that confirms the positive relationship between employing modern systems Improve the performance<sup>25</sup>. Where marketing information systems support the administrative tasks and make marketing decisions efficiently and effectively, by providing appropriate information and processing and analysis of information.

The results have shown that the impact of internal records is positive in achieving brilliant financial

performance. Data and information contribute to the internal environment of the organization in improving decisions as well as being adopted as a system for internal reporting and internal accounting systems<sup>8</sup>, And the adoption of data processing system on these records and periodic reports on competitors and customers, which contributes to reducing costs and improve financial performance<sup>26</sup>. Marketing systems also positively influence brilliant financial performance. The computerized system contributes to the processing of data and information processing and its use in decision making<sup>27</sup>. In addition, it investigates the marketing plans of the hospitals by providing early warning of problems that can get, and provide timely and appropriate solutions, which is positively reflected in financial performance.

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# The Source between Arabic and Persian, an Applied Study in Surat Maryam and its Translation

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## ABSTRACT

This research has conducted a contrastive study between the Arabic and Persian languages in one of their linguistic aspects at the morphological level, which is the structure of "Nouns" through looking at the similarities and differences between them by following the contrastive descriptive approach. It was necessary to find out the dimensions of this linguistic method to collect the observations and grammar that were scattered in books and morphological studies which are closely related to the contrastive analysis reaching to a comprehensive and accurate perception of the phenomenon as it is in the language reality; and as it is in the perception of morphologists and language researchers through their studies and their morphological and linguistic observations. The sources in Arabic are tripartite, quadripartite, bare source and augmented, but it differ in the Persian language. In terms of morphological structure, that it is divided into simple and compound; and in terms of types divided into an original source, verbal, compound, apocopate, the source with both forms, the gerund and the inflected source.

**Keywords:** Structure of nouns, Comparative study, Surat Maryam, Persian language, the source.

## INTRODUCTION

Praise be to Allah, the Lord of the worlds, and peace and blessings of Allah be upon our Prophet Muhammad and on his good family. As we know that Allah (His Almighty) has ensured the preservation of his Glorious and holy book "Quran" when Allah (His Almighty) said: (Verily, We, it is We Who have sent down the Dhikr (i.e The Qur'an) and Surely, we will guard it (from corruption) (Surah Al Hijr) and one of the preservation or guarding means was to preserve and guard the language of Holy Qur'an. Besides that, The Arabic has close relations with many languages of the world, such as the Persian language. The relationship between the Arabic and Persian languages is ancient, and as old as the neighborhood of Persians and the Arabs. These relations reached its peak and strength after entering. The Islam to Persia and merging the Arab and Persian cultures, forming one Islamic culture. They have grown up in a rather common environment, so we find the common denominators and the common elements between these two languages so that many words, many semantics, concepts and basis can be shared. In this research, and after considering some of the Holy Qur'an translations,

I have chosen only four translations: The translation of (Mehdi Muhiee Al Deen Elahi Qamsha Ayi), Muhammad Mahdi Fuladond, the translation of Abdul-Muhammed Aiyti, and the translation of Ayatollah Nasser Makarim Al Shirazi.

### First: Types of sources in Arabic and Persian

**A. In Arabic:** Sibawayh says that the source is "the event, the two events and the verb", while Al Mubarak says "the source is the noun of the verb or the gerund" <sup>(1)</sup>, which indicates the event only. It is called an "event" and a "meaning name" <sup>(2)</sup>. Its Types: the tripartite, non- tripartite, the gerund, the (mimi) source, the form source, frequency source and the artificial source. But the form source, frequency source and the artificial source did not mention in blessed Surat Maryam.

1. The tripartite and non- tripartite sources the tripartite source is the verb that comes on one of these weights (Fa'al), (Fa'aul), (Fia'alah), (Fia'al), (Fia'alan), (Fa'aal), (Fa'aeel), (Fa'aulah), (Fa'ala), (Fa'al) and (Fua'alah); while the non- tripartite source ; is the verb that

comes on one of these weights (Ifa'al), (Fa'al – Tefa'aeel and Tefa'alah) and (Fa'ail – Mufa'ala and Fia'al).

2. **The gerund:** The grammarians referred to the gerund as an indicative of an event and its gender, and it differs verbally and estimationaly of its verb by some letters, without compensation, such as: gratuity, reward and peace <sup>(3)</sup>, while “Sibawyah” referred to the gerund as ( it is the source that comes in opposite to the verb because the meaning is the same), and Al Mubarak considered it as a noun in the meaning of the source, such as: (Selema -Selamn) i.e (greetings) where the origin is (tesleemn)<sup>(4)</sup>.
3. **The Artificial source:** Ahmed Hamlawi was the first person who used this term” The Artificial source “in his book” Shaza Al Uraf Fi Fen Al Serf), when he said: (it is formulated from the word (i.e we formulate a source from the articulation), it is called the Artificial source where a (stressed yaa) followed by (the feminization t/ taa) at the end of the verb are added to increase the word), to indicate the event, such as : (divinity/ Illuhyah) and (equestrian/ Furussyah), (Genius/ Abqariya), (freedom/ Hurriyah), (tribalism/ Qabaliyah), and (distance/ Ba'adiyah) <sup>(5)</sup>.

#### B. In Persian

1. The source refers to an event that does not relate to a person or a time, and ends with an infinitival suffixes (-tan) and (dan), such as, estamad, in this phrase: Eastden Jayes nist= No Parking.
2. The source in the Persians language is either verbs ending with “- d and n”, such as: *xāndan* ‘to read’, *didan* ‘to see’, or verbs ending with « – t and n », such as: (raftan <to go>) and *suxtan* ‘to burn. ’Some Persian linguists call the first type with”d/ dali source “and the second one “T/ Ta’i source”<sup>(6)</sup> as was mentioned in Mirzah Habib Al-Asfahani’s book.

**Difference between the source and gerund:** The source indicates the verb done by a subject, and also we derive the verb from this source when the gerund and source quotient is the result of the source, for example: [Bakhshidan and Afridan] are sources that produce: [Bakhsh + sh = Bakhshsh], and also [Afrin + sh = Afrinsh]. i.e produce a gerund <sup>(7)</sup>.

**Second: The Sources of Tripartite and Non-Tripartite Verbs:** The Arabic linguists agreed on a proven standard of source which consists of more than three letters, while their views varied about the tripartite source, where some of them said: that part of these sources are auditory and the standardization cannot be done because of the abundance of its weights, and the disparity of its abundance, scarcity and anomaly, and some of them say: we can standardize tripartite source as the non- tripartite source, and then the standardization can be done, and the majority of linguists stopped at a middle position to standardize the source when the hearing be not existent<sup>(8)</sup>.

#### First: Tripartite Sources:

1. **Fua'al: (Dua'a: invocation)** Allah his Almighty says: (And I have never been unblest in my invocation to you) [Surat Mariam]. (D u a) is that the thing tends to you by a voice and words be from you. Where you say: (I invocated/ invoke/ an invocation) “Dua’a”. Sibawyah says: (The invocation is the same as the command and the prohibition, it was said: “Dua’a/ invocation “; because it isn’t better to say: ordered or forbidden). Ibn Duraid mentions that the “dua’a/ invocation” ‘is a source of (Da’a/ invocated, Yada’aw/ invocates, Da’awn/ and du’aa/invocation’, and its end is elongated <sup>(9)</sup>.

Al-Sumein al-Halabi says: (when he said: “my invocation to you” is an added source for its object, ie, my invocation for you). The translation of the source “Duaa/ invocation” in Persian translations was “Da’a/invocate, and the Arabic word was used here but without the final Hamza, that the Persian do not use the final Hamza, and it is considered as simple noun in Persian that indicates feelings and emotions <sup>(10)</sup>.

2. **f'al: kibr** “Al kibar” with “Kesra” under the “k” is a noun derived from “Al Takbur” and from the verb (Kabura Yakburu Kiburun, Kuburn and Kibern) so it is “kebeer, Kubar and Kubar” with a stress, and the feminine with “ha”, and the plural is “Kibar” and “Kubarun” <sup>(11)</sup>.
3. **F'aula: Quwa/power** His Almighty says: (O Yahya, hold fast the scripture) [Mariam]. Al quwa (Power) is an auditory source of (qewi/ yuqewi : strong), which its “eyen and lam” have been merged after the change, and its origin is [qewiyah/ strong] where the “waw and yaa” met, the first of them was with “sukun” so it was changed into “waw” and was said: [Qia] with “dhuma” on the “qaf”, and

was said: [qwa/ force], because the first “lam” came with “sukun “ that proceeded by “dhuma” therefore it was changed into “waw”; and Ibn Ashour says: ( Al quwa/ strength: means a moral strength, which is the determination and stability). Sometimes “Al quwa/ power” means the strength of hear as Allah said: “Oh Yahya hold fast the scripture strongly, ie: the power of heart. While Fuladund translated “quwa/ power” into “hardness and effort” in his translation, which is a compound noun that consisted of two nouns that mean “endeavor”. While translated into “strength” in the translation of al-Hashemi Qamshi, and Makarem Shirazi, which means “power”, which is a simple noun in Persian. Ayeti translated it into “Neromandi” in the sense of “enthusiasm” since “mand” is a suffix for the adjective structure, so “Neromandi” is a participle derived from the adjective “neromand” + infinitival “i”<sup>(12)</sup>.

**Second. Non-Triangular Sources:** The Non-triangular sources are all standard and measured according to its verbs. The linguists mentioned that the Non-triangular verb has standard sources, and the non-triangular verb is either abstracted quadruple on “Fa’alel” weight or more, such as “Ifa’al/ do, fa’ail and fa’al”, or a verb that starts with “hemza” such as (Inf’a’al-Ifta’al-Ifa’al ) or starts with “taa” such as “Tefa’al, Tefa’al, tefa’alel” or more than three letters that start with “hemza” such as “Istfa’al, Ifa’al, Ifa’alel, Ifa’alnl... etc), and was mentioned in Surat Maryam in one weight, which is:

**Fa’aal: Nida’a/ Call** His Almighty said: (When he called out his Lord Allah a call in secret) [Mariam]. It is derived from the augmented triangular verb” nada/ called, yunadi, nida’an/ a call “and” munadat/ calling. Which means called or shouted; The call: is raising the voice and its appearance, and this may be said to the abstracted voice, that the call referred in this verse to the appeal to Allah, because he imagined himself away from him with his sins, and his bad conditions as if he fears Allah’s punishment. The translators agreed to translate the source “appeal” to “Nidaa” and they used the Arabic pronunciation but without the final “hemza”, that the Persians do not use the final “Hamza”, and it is considered a simple noun in Persian<sup>(13)</sup>.

**Third: The Gerund:** This term was used by the most ancient linguists that it was mentioned by Sibwya, Al Mubarak and Al Radhi and others. One of these definitions is the gerund that refers to an event, where the significance of the gerund to the event be by its indications and the realization of their meaning.

**1. F’al: Mukhadh/childbirth** His Almighty said: (and the pains of childbirth drove her to the trunk of the palm)/ Mariam. M kh dh, indicates disturbance of something in the fluid, and” al mukhadh childbirth: the pregnant camels, and its singular is “khelfa”. Al mukhadh/ childbirth, is the source of “mekhadhet, temekhdh” “the pregnant birth”, which means her close to give birth. Its weight is “f’aal” with “fatha” on the “faa”, and there is another source with “kesera” under the “faa”. It is said that the “Mekhadhat”/ pregnant woman to give birth and “temkhadh” the child has been produced in her abdomen, with “fatha” above the “min” which is the pains birth, also it is a gerund as “Al ataa/ giving “, “ Al salam/ peace”. And the source with “kesera” such as” Al qital/ fighting “and” Al liqaa/ meeting”, and “Al Fi’aal” was mentioned as “Al Eqab/punishment”, “Al Taraq/ knocker”.

**2. Fa’ala: Salat/ Prayer** His Almighty said: (And he has enjoined on me salat “prayer” and zakat as long as I lived) Mariam. “Al Salat/ Prayer” is a gerund for the augmented triangular verb “sala, yusali/ prayer” or it is considered as it’s source from the stem “s l u” and the “taa” is called the femininity “taa”, it is an abstracted triangular noun, a figurative feminine which its origin is “Al salwat”, and the “alf “in” salwat “was”waw” because it gathers “salwat “and “ al salat “ prayers from, also like zakat from “Zaka” which is written with “ waw “ which came with “fatha” then changed into “alf “, and when the two “alf “ met, and the first one changed into the “waw”, then the “fatha” was put, to fit the second “alf “ after that. Here, the source was used as the use of non-sourcing nouns because it indicates specific words and actions. Ibn Fares sees that (“salat” prayer) is a du’aa/ invocation, and that “salat” prayer is lenient the stick with fire to lenient it, because the worshiper is lenient with prayer, and the “alf “of” salat/ prayer” is derived from “waw”<sup>(15)</sup>.

**Fourth: Mimi Source:** It is a standard verb as indicated by al-Suyuti, and it was mentioned in the ancients, but they did not call it this name, Sibuya said: (If you want the source you form it on “mufa’al” weight, as your saying: there is a “mudhraban/ type” in thousand dirhams;<sup>(16)</sup>.

## CONCLUSION

1. The research dealt with the sources and gerunds forms and the difference between them, as well as the formulas of the source and its implications. The research was documented with the necessary

resources such as references and various different resources to serve the requirements of the scientific research and its conditions. The research revealed the overlap of the standard sources and the auditory sources and that the attempt to differentiate between them definitively was not confirmed by the use of language. The study showed that the dominant formula of the sources in Surat Maryam was the formula of “fa’al”. Despite the delay in the codification of Persian language studies on the Arabic language, some of the Persian morphological objects exceed the Arabic ones and the source is one of these objects. The Arabic source is divided into a triangular, quadratic and quintet, unlike the Persian ones, which is divided on the basis of its simple structure by adding the infinitival (n) to the single word, and the compound one. The second word is an auxiliary, and adding the suffixes of the source. The source carries some of the functional characteristics of the verb along with some characteristics of the noun, if the source acts as a verb.

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# The Role of Physical Activity in Determining the Level of Older People's Depression

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## ABSTRACT

**Background:** The prevalence of depression in elderly is high. Globally, the incidence of depression in the elderly varies between 10-20 %, as well as in Indonesia (17.8 %). Depression can increase the amount of disability for almost 12 % of total incapacity. It is important to make efforts to prevent the occurrence of depression in older people by implementing physical activities. The research aimed to determine the effect of different physical activities on depression levels in older people living in in the working area of Sronдол public health center of Semarang municipality.

**Method:** A nonrandomized controlled trial with pre-posttest design conducted on three intervention groups consisted of 10 elderly in each group using different treatment: free walking, brisk walking, and the combination of comfortable walking and brisk walking.

**Results:** Research results showed that there was no statistically significant effect of different physical activities in the three groups regarding the levels of depression in older people in Sronдол Public Health Center of Semarang municipality ( $p > 0.05$ ).

**Conclusion:** The comfortable walking had the highest mean difference in reducing depression level of the older people compared to brisk walking and the combination of strolling and brisk walking. It is suggested that physical activity for elderly can be performed as it still has benefits in reducing depression scores, especially with sauntering.

**Keywords:** *physical activity, strolling, brisk walking, depression, older people*

## INTRODUCTION

The increasing number of older people is caused by many factors. Factors that contribute to the growing number of the elderly include the improvement of social, economic status, advances in health care, and the increasing level of public knowledge <sup>(1)</sup>. The growing number of elderly population spread in almost all provinces in Indonesia; however, the provinces that have an older population of as much as 7 percent are in Java Island and Bali.

Physical inactivity in older people also has an impact on the psychology of the old. The elderly often feel isolated and loss of close friends. This condition often causes the elderly to be hopeless and will trigger the old to a less physical activity which leads to depression incidence. The overall prevalence of the impact of depression in the elderly in general varies between 10-20%, which also depends on the cultural situation in each region of the world <sup>(2)</sup>. Several studies show that the risk factors for depression in the elderly include psychosocial, biological, personal characteristics, medication and socio-demographic factors <sup>(3)</sup>. Besides, the incidence of depression in the elderly was associated with lack of physical activity undertaken <sup>(4)</sup>.

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Depression in older people can lead to problems for the elderly itself. Depression can cause the increasing number of disability, accounted for almost 12% of the

total disability that it is needed to make efforts to prevent the occurrence of depression in the elderly, one of which is physical activity.

Physical activity is significant for the old. It is intended that the elderly can do daily activities optimally without feeling burdened by their physical condition that is declining. Physical activity has positive effects on reducing depression in older people. Physical activity performed by older people both moderate-intensity physical activity and vigorous-intensity physical activity is significantly lower minor and major depression in the elderly. Physical activity in the elderly can be performed in various ways. In general, physical activity in the elderly can be done in three ways: light-intensity physical activity, moderate-intensity physical activity, and vigorous-intensity physical activity<sup>(5)</sup>. The purpose of this study was to determine the effect of different physical activities on the level of depression in the elderly in a public health center of Semarang, Central Java Indonesia.

## METHODOLOGY

This study was a non-randomized controlled trial with pre-posttest design conducted on three intervention groups. Each group was measured the levels of depression using the BDI (Beck Depression Inventory) II before and after being performed the different physical activity. Intervention group I was given treatment in the form of

a combination of physical activity using comfortable walking and brisk walking which was conducted during one week with the duration of time for 23 minutes of the walking slowly and for 21 minutes for the brisk walking. Intervention group II was given regular physical activity (leisurely walking) for one week with the duration of time for approximately 23 minutes daily, and the intervention group III was given brisk walking for a week with the length of time for about 21 minutes daily.

The population in this study was all elderly who live in Srandol Public Health Center of Semarang. Healthy elderly aged  $\geq 65$  years, had normal BMI (Body Mass Index) and had no health problems on the musculoskeletal and cardiovascular system were included in the study following informed consent. Elderly who suddenly experienced worsening health problems were excluded in the survey. Thirty older people participated in the study and were distributed in three intervention group. The instrument used in this study was the Beck Depression Inventory (BDI) II consisted of a 21-point scale question with four options (0-3). This tool is used as it has a one-week high test-retest reliability ( $r = 0.93$ ) and also high internal consistency ( $\alpha = 0.91$ )<sup>(6)</sup>. Based on the BDI II instrument, it can be categorized as levels of depression (cutoffs) into minimal depression (score 0-13), minor depression (score 14-19), moderate depression (score 20-28), and severe depression (score 29-63).

Paired t-test was performed to examine the mean difference in each intervention group.

## RESULTS

Sample Characteristics is shown in Table 1.

**Table 1: Characteristics of respondents**

Characteristics	Intervention Group I*	Intervention Group I**	Intervention Group I***	P- value
No. of participants	10	10	10	
Age (Mean $\pm$ SD)	62.20 $\pm$ 8.651	62.90 $\pm$ 3.755	62.50 $\pm$ 3.824	0.425
<b>Sex</b>				
Male	2 (20)	4 (40)	3 (30)	0.914
Female	8 (80)	6 (60)	7 (70)	
<b>Education</b>				
Elementary School (SD)	5 (50)	2 (20)	4 (40)	0.759
Junior high school (SMP)	2 (20)	5 (50)	3 (30)	
Senior high school (SMA)	2 (20)	3 (30)	2 (20)	
University (PT)	1 (10)		1 (10)	



**Note:**

\*) = combination of physical activity (walking-slowly and brisk walking)

\*\*\*) = regular physical activity for one week with the duration of time for approximately 23 minutes daily

\*\*\*\*) = fast walking for a week with the length of time for about 21 minutes daily

The level of depression during pretest is shown in Table 2.

**Table 2: The level of depression**

Intervention Group	Depression level (Mean ± SD)	Depression category
I	11.30 ± 7.846	Minimal depression
II	15.80 ± 6.408	Minor depression
III	19.90 ± 7.738	Minor depression

Table 2 shows that the degree of depression in group I (a combination of leisurely walking and brisk walking) is a minimal depression. Whereas in group II (comfortable walking) and group III (brisk walking) at the level of mild depression. The results showed that all

intervention groups experienced a minimal degree of depression to minor depression.

The level of depression during post-test is given in table 2.

**Table 3: Level of depression**

Intervention Group	Depression level (Mean ± SD)	Depression category
I	10.30 ± 8.407	Minimal depression
II	12.10 ± 5.343	Minimal depression
III	11.96 ± 9.701	Minimal depression

Table 3 reveals that after being given treatment in each group, the average score of depression is decreased. In group II and group III, depression levels decreased from mild depression to minimal depression. Whereas in group I remain at a minimal depression. The results showed that in all groups the low rate is in minimal depression.

The difference level of depression before and after the intervention is provided in table 4.

**Table 4: The Difference level of Depression**

Group Intervention	Depression level (pretest)	Depression level (posttest)	Mean Difference	p-value
I	11.30	10.30	1	0.547
II	15.80	12.10	3.7	0.417
III	19.90	11.96	7.94	0.720

Table 4 shows that both the intervention group I (leisurely walking and brisk walking), group II (brisk walking), and group III (leisurely walking) was no significant difference between the mean score of depression level before and after intervention ( $p > 0.05$ ). However, the decreasing of mean difference of group III (leisurely) was the highest (7.94). The results showed that although the average means score of depression level was decreased, however, this reduction was not statistically significant ( $p > 0.05$ ).

**DISCUSSION**

Research result shows that the level of depression in a group which was given the combination of leisurely walking and brisk walking is categorized as a minimal depression. Whereas in group II that was given

comfortable walking and group III by brisk walking is classified at the level of minor depression. The results showed that all intervention groups experienced a minimal degree of depression to mild depression.

Older people are groups of people that have the risk of suffering from depression. It is often associated with the condition of the elderly, mainly related to the situation of facing retirement, the death of his/her couple, physical function decline, changes in psychology and mental, health issues, and social isolation. The incidence of depression in the elderly in this study can be related to the age of the elderly which is in the range of 60 years old because the highest incidence of depression would occur in the elderly of 60-74 years old (?).

The incidence of depression in the elderly may be contributed by gender. The prevalence of depression is

common in women than men because it is associated with early onset of menopause or post-menopause<sup>(8)</sup>.

After being given treatment in each group, the average score of depression is decreased. Both in group II and group III, the depression levels decreased from minor depression to minimal depression. Whereas in group I remain at the degree of a minimal depression. The results showed that in all groups the low level is in minimal depression.

This occurrence is probably caused by physical activity undertaken by the samples. Physical activity that is conducted either by moderate-intensity physical activity or vigorous-intensity physical activity is very effective in reducing both minor depression and major depression in older people<sup>(9),(10),(11)</sup>.

Research result showed that there was no significant difference between the mean score of depression level before and after intervention in overall groups ( $p > 0.05$ ). However, the decreasing of mean difference of group III (walking slowly) was the highest (7.94). This is likely due to physical activity performed by the elderly still in short period (one week), so that the old may not yet be regarded as a daily routine activity and as a part of the needs of everyday life. Physical activity is aimed more at the day-to-day operations to spend older people spare time such as the walking event that is inseparable from daily life activities of the elderly<sup>(5)</sup>. For comparison, physical activity in the form of gym for old that is usually conducted in Indonesia - namely “*Senam Lansia*” or The Gymnastic for Older People - will have a positive impact if it is performed 3 times a week and at least 12 times monthly with duration of 60 minutes for each activity<sup>(12)</sup>.

Based on the three forms of intervention given in the study, physical activity of comfortable walking shows the highest mean score (7.94) concerning the decreasing of depression level compared to the brisk walking (moderate-intensity physical activity) and the combination of physical activity (leisurely walking and brisk walking). This is probably related to activity conducted by slow walking is more relaxed, so the elderly do not feel overwhelmed and not require much concentration to perform activities as the brisk walking and the combination of both leisurely walking and brisk walking

## CONCLUSION

Although there is no statistically significant effect of different physical activities on the levels of depression

in older people in this study, however, the slow walking had the highest mean difference in reducing depression level of the older people compared to brisk walking and the combination of walking slowly and brisk walking. It is suggested that physical activity for elderly can be performed as it still has benefits in reducing depression scores, especially with strolling. Further studies are needed to use larger samples and longer duration of the activity, and laboratory examination (e.g., cortisol hormone) to support the levels of depression in elderly.

The limitation of this study is the number of samples that do not meet the sample size (90 elderly) for each group, and the duration of the implementation of physical activity which is only one week. Another limitation of the study is that there is no measurement of depression indicator (e.g., cortisol hormone) by laboratory examination.

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**Ethical Clearance:** Before conduct of the study written permission was obtained from Politeknik Kesehatan Kementerian Kesehatan Semarang, Indonesia. Consent and willingness were established from all the subjects who meet inclusion criteria of this study.

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# Nurse's Competence in Supporting the Spiritual-Religious Needs of Patients in Indonesia

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## ABSTRACT

**Introduction:** The fulfilment of religious ritual needs is a form of spiritual nursing intervention. The main Islamic ritual is the *fardhu* prayer, which should not be abandoned despite illness and hospitalisation. The purpose of this study was to find out the nurse's constraints relating to help to meet the need of conducting *fardhu* prayers for hospitalised patients from their experience of providing nursing care to patients.

**Method:** This study was a qualitative, using the phenomenology approach, focusing on 8 associate nurses, 3 nurse managers and 1 participant, who was the Head of the Spiritual Counselling division. Data collection was done through a Focus Group Discussion and the data analysis used the Colaizzi method.

**Results:** The results of the study yielded four main themes: the competence of nursing services for *fardhu* prayer, the availability of facilities, the perception of constraint on the patient, and limited support.

**Discussions:** The nurses' competency at fulfilling the spiritual needs of patients in Indonesia should be developed and fostered in order to accommodate the health needs of Indonesian society as a whole.

**Keywords:** *fardhu* prayer, Muslim spiritual nursing service, Islamic religious ritual

## INTRODUCTION

Nurse provides holistic nursing care by helping to meet the patient's bio-psycho-social and spiritual needs comprehensively. Humans are religious beings that have basic spiritual needs<sup>1</sup> as well as biological, psychological and social needs. Spirituality and religion are different entities<sup>2,3</sup>, but interconnected. The study of spirituality shows the link between spirituality and religion<sup>4-6</sup>. Therefore, the fulfilment of religious ritual needs indicates the fulfilment of spirituality needs.

Most of Indonesia's population (87.18%) is Muslim<sup>7</sup>. The main ritual in the Muslim religion is the

*fardhu* prayer, conducting 5 times a day; shalat shubuh, dhuhur, ashar, magrib and isyak. The *fardhu* prayer cannot be abandoned by an adult Muslims, even when they are ill and hospitalised, so long as he/she has full consciousness<sup>8</sup>. Helping Muslim patients perform *fardhu* prayers is in line with the 14 basic human needs according to Henderson (1955), a figure and theorist in the context of nursing. This is in order to meet the needs of the patient concerning "worshiping faith"<sup>10-12</sup>. Helping Muslim patients to do their *fardhu* prayers is also a form of nursing intervention in nursing diagnoses: "impaired religiosity". The criteria or characteristic definition of nursing diagnoses is the difficulty of obeying religious rituals and the difficulty of adhering to religious beliefs when ill. One of the etiological factors of nursing diagnoses is illness, pain and end-of-life crises<sup>13</sup>.

Preliminary studies showed that nurses have not been able to help Muslim patients perform their *fardhu* prayers when they encounter various obstacles. This

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requires qualitative research in order to understand the constraints faced by nurses when helping Muslim patients perform *fardhu* prayers based on their experience of providing nursing care.

## METHOD

This study was a qualitative research conducted using the phenomenology approach, aiming to find out the nurse's constraint related to helping to fulfil the requirement of *fardhu* prayer of hospitalised patient's based on their experience of providing nursing care to the patient<sup>14</sup>.

**Setting and Participants:** The study was conducted at the Haji Hospital in Surabaya. This is because the hospital pays good attention to Islamic spirituality, at least in the form of posters and guidance on prayer. The participants of this study were as many as 12 people, consisting of eight associate nurses who provide nursing care to patients, the Head of the Nursing Division, the Secretary of the Inpatient Installation and the Head of Spiritual Counselling Division. The inclusion criteria of the study were that the nurses had at least graduated from a Nursing vocational program, provided direct nursing care to patients, and who had worked on the wards for more than or equal to 5 years.

## DATA COLLECTION AND ANALYSIS

The data were collected via a Focus Group Discussion in the Musdalifah Meeting Room on the 4th Floor of Haji Hospital, Surabaya. This discussion facilitated the nurses in talking to one another and commenting on one another about their experience of helping to establish prayer for patients. The data analysis used methods developed by Colaizzi (1978), as cited in Steubert & Carpenter (2003) and Polit & Back (2012). The data analysis consisted of seven steps as guided by Colaizzi (1978).

## RESULTS

**Competence of nursing care of *fardhu* prayer:** The theme of nursing care competence in establishing *fardhu* prayer was identified from the sub-theme of prayer needs assessment, helping in the patients' ablutions, and helping the patients to pray. The sub-theme of prayer needs assessment was described by the category of prayer needs identification.

The category of prayer needs identification was an instrument of the spiritual needs assessment, especially with regard to worship, such as:

*"... the opening sentence was needed as an opening to determine the patient's need for prayer". (P6)*

*"Our initial assessment included that spiritual aspect too, and just not focus". (P7)*

*"... certain assessments must exist for the spiritual part, so then the nurse can assess the patient's spiritual needs". (P8)*

The sub-theme of helping the patients in their ablutions is described in the patient's ablution and *jinabah* procedures. The category of patient ablution is the capacity of the nurse to teach and help in the *tayamum* and ablution of the patients, such as in the following statements:

*"... give us knowledge of the problem of ablution,..." (P1).*

*"... we also cannot explain how the tayamum and ablution. (P2)*

*"... we cannot provide such care, like tayamum and others. I think that is the reality. ..." (P4)*

*"... those who have direct contact with the patients 24 hours a day are the nurses, so they must understand how to give help in ablutions and praying for and with the sick". (P6)*

The *jinabah* procedure category is how to explain and assist in the patient's *jinabah* after menstruation, such as in the following statements:

*"... the women who have finished their menstruation have never asked about how to clean up for the next prayer. We also have not been able to provide an explanation. "(P2).*

The sub-theme of helping in the patient's prayers has been identified from the category of the patients' prayer procedures and the patients' prayer implementation. The category of the patient's prayer procedure was an explanation of the patient's prayer procedure by the nurse, as in the following statement:

*"... because of my limitations as a nurse on duty, I acknowledge that for the problem of prayer it has not been dealt in regard to the patients." (P1)*

*"The problem is that **not all understand about prayer when in an ill condition and not all pray during illness.**" (P6)*

*"... we still cannot give a detailed **explanation of prayer when in condition of illness.**" (P7, P2)*

The category of prayer guidelines are stated within prayer guidelines book for patients, such as the following statement:

*"**Guidance is needed so that our colleagues can teach according to Islamic principles.**" (P5)*

**Facility availability:** The theme of facility availability is identified from the sub-theme of supporting facilities and the place of prayer. The voice of participants were mentioned in the following statements:

*"... there is already a direction for qibla, but our bed model does not match the existing direction of qibla." (P1)*

*"In our room as it is now, **the direction for qibla is gone.**" (P2)*

The category of prayer time warning is the absence of a five-time *fardhu* prayer warning that can be heard throughout the room, as in the following statements:

*"In the past, there was a **speaker in the room saying the prayers, but now there is not anymore.**" (P2)*

*"... for the problem of prayer, there is a **call from Binroh per phone but still, this is not all the time, such as for magrib, isyak and shubuh.**" (P3)*

*"Actually, not everyone has got a call from the Binroh, but they did at the time of **dhuhur. Dhuhur only, and, if I am not mistaken, for ashar too...**" (P4)*

The category of ablution in the room related to the separator, especially for women, so then during ablution they are not seen by others, such as in the following statement:

*"... this room has not been at all **separated, so then the women performing the ablution... parts of their body, their legs and hands, can be seen. If these are left uncovered, we sin.**" (P6)*

The category of prayer place in the ward consists of the absence of a special prayer place for the patient and his family in the ward, as the following statements indicate:

*"... the patient's **family usually prays close to the patient's bed.** ..." (P1)*

*"... **mushala in the ward. ... there is a mosque on the 1st floor, but nothing on the ward.**" (P2).*

**Perception of Constraints:** The theme of perception of constraints was identified from the sub-themes of the nurse's perception of constraint. The sub-themes of the nurse's perception of constraints consisted of a picture of the category of patient dependency, personal hygiene, and the patient's willingness to pray.

The category of patient dependency consisted of the nurse's perception of poor patient condition, such as the following statements:

*"... in our ward, there is a lot of **CKD and hepatic cirrhosis cases with melena haematemesis.**" (P1)*

*"... sometimes on our ward, there are also patients with **gangrene.**" (P2)*

The patient's personal hygiene category consists of the nurse's perception of the patient's hygiene condition, such as the following statements:

*"... the obstacle to spiritual fulfilment is, first of all, the **cleanliness of the patient themselves.**" (P1)*

*"... many patients have **hygiene problems.** ..." (P2).*

The category of the patient wishes for prayer showed that, so far, some patients want to keep praying, as in the following statements:

*"The patients really **want to pray, Sir!**" (P1)*

*"... prayer is a very **basic necessity for Muslims**" (P6)*

*«... patients usually have a **desire for worship,** .." (P8).*

**Limitations of support:** The theme of support limitations was identified from the sub-theme of lack of support. The sub-theme of lack of support was illustrated by the categories of hospital management support and patient family support. Hospital management support included a statement from one participant as below:

*"... the spiritual field has not been touched. **The management should facilitate.**" (P4)*

Patient family support was also reflected in the statements of the participants:

“... usually patients have a desire for worship, but it turns out **his family is less supportive.**” (P8)

“... there must be a **particular motivation from the family in the spiritual field.**” (P8)

## DISCUSSION

The nurse's constraints in relation to helping to fulfil the prayer needs of the patient were identified from the theme of nursing care for *fardhu* prayer, the availability of facilities, the perception of constraints and the limitations of support. Nursing care competence related to helping the *fardhu* prayers was identified from the sub-theme of prayer needs assessment, helping the patients with ablution and helping the patient to pray. Competence refers to the abilities of the nurse, including the ability to identify the patient's need for prayer, knowledge of the patient's cleaning procedure, including ablution and *jinabah*, knowledge of the prayer procedures of the patient in accordance with Islamic *shari'ah* and the availability of prayer guidelines for the patient to access.

Knowledge on the patients' prayers is one of the domains of nursing care competence related to helping them in *fardhu* prayers, in addition to communication skills for assessment, skills related to providing help for *fardhu* prayer to the patients, and the attitude toward patients who need help *fardhu* praying. This is in accordance with the definition of competence according to the National Council for State Board of Nursing (2005), as cited in Tilley (2008), which states that competence is the application of knowledge, interpersonal skills, psychomotor skills and the decision-making expected for the role and the task itself. The competence of the nurses when providing nursing care related to *fardhu* prayers can be improved through: 1) the improvement of nurse awareness that *fardhu* prayer is a form of spiritual intervention for Muslim patients, 2) the provision of training and 3) the availability of guidance to provide nursing care for the patients related to *fardhu* prayer.

The theme of the availability of facilities was revealed from the sub-theme of supporting facilities and place of prayer. Supporting facilities are facilities in place to support *fardhu* prayer, which consists of the qiblat direction, warning of the coming prayer time, and there being an ablution place in the ward. A prayer

facility is the providing of prayer rooms for the patients and their families.

The timing of prayer with the application of current technology is easy to implement, either through the *adzan* from the mosque in the hospital heard in the ward or projecting a warning through the speakers on the ward. Ablution can be done in the ward's bathroom, but this is difficult for patients who suffer from weakness and when there is therapy equipment attached to the body. Ablution for the patients can be improvised using a sprayer bottle filled with clean purified water<sup>8</sup>.

The place of *fardhu* prayer is adjusted according to the ability of the patient. Patients can pray according to their ability and patients can be categorised as facing difficult obstacles, in order to get dispensation in relation to their prayer procedures, including regarding the place of prayer<sup>15</sup>. The theme of perception of constraint is related to the nurse's assumption that there are constraints when seeking to establish *fardhu* prayer. This theme was identified from the category of patient dependency and personal hygiene, but there is also the patients' desire to pray to consider.

The theme of support limitations is identified from the sub-theme of lack of support. Lack of support was identified from the category of hospital management support and family support. The limitation of this support is the perception by the nurses about there being a lack of support from the hospital organisation and the patient's family when it comes to helping the patient perform the *fardhu* prayer. Support, both from the hospital and the patient's family, is needed to help the patients in their prayer because of the high workload of the nurses<sup>16</sup>.

Hospital support is necessary for the implementation of the nursing service model to help *fardhu* prayer. The hospital, as health care organisation, has an obligation to provide support for all sub-systems that it supports. Hospital support has several advantages, including positively affecting job satisfaction and employee commitment<sup>17</sup>, positively affecting employee performance through employee job satisfaction<sup>18</sup>, and is positively related to employee engagement.

## CONCLUSION

The nurse's obstacles can be found in relation to four themes; no nursing care competence to help in *fardhu* prayer, facility availability, the perception of the constraints of the patients, and limited available

support. Teaching students and training nurses about nursing care in relation to helping and promoting *fardhu* prayer for Muslim patients is needed to improve nursing competence when conducting spiritual nursing interventions.

**Ethical Clearance:** This study obtained the Certificate of Ethical Clearance from the Research Ethics Committee of the Faculty of Nursing in the Universitas Indonesia Jakarta No. 177/H2.F12.D/HKP.02.04/2014..

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**Conflict of Interest:** None.

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# Awareness on Substance Abuse among Universiti Utara Malaysia Students

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## ABSTRACT

Substances abuse are substances taken illegally and are listed under the 1952 Poisons Act such as kratom and are listed under the Dangerous Drugs Act 1952 such as heroin, opium, ketamine, methamphetamine, cannabis, and other substances that causes addiction or dependency physically or psychologically. This survey was carried out to study the awareness of Universiti Utara Malaysia (UUM) students on substance abuse. This study is a survey and is a quantitative study. A group of 159 students were randomly selected from the Creative Industry Management and Performing Arts programme (SCIMPA) in UUM. A study instrument in the form of a questionnaire from previous study was used. The collected data are then analyses using descriptive tests through the Statistical Package for Social Science (SPSS) version 22. The result showed that a majority of students had awareness on substance abuse and its effects on the users. Most of them also reported having awareness on the usage of kratom and cough medication. However, results also showed that the students had less awareness on the usage of prohibited substances such as opium, morphine, depressants and other hallucinogens because they seldom hear of these substances. Besides that, students are also aware of the negative effects of using prohibited substances. Hence, some suggestions are also discussed by the researcher regarding how to handle the issue of prohibited substances use in UUM campus so as to ensure the welfare of UUM students.

**Keywords:** *Prohibited substances, Substance abuse, Kratom, Drugs, Awareness*

## INTRODUCTION

Nowadays, the usage of prohibited substances such as heroin, opium, ketamine and also kratom is not something new. Drug abuse is often the cause of negative behaviors of individuals or users such as hallucinations, being drunk, uncontrollable, being high and many more<sup>11</sup>. In Malaysia, substance abuse are substances that are illegally used and are listed under the Poisons Act 1952 such as kratom, and listed under the Dangerous Drugs Act 1952. Meanwhile, drugs are chemicals, whether natural or imitation, taken through injection, inhalation, smoked or eaten and gives negative impact towards one's bodily function physically or mentally. Substance abuse will not only cause harm on the individual, but will

also cause one's quality of life to deteriorate and finally cause addiction which can eventually lead to death. The World Health Organization (WHO) explained that drugs are partially natural whether artificial or chemical. Using these drugs in any way will cause addiction and cause health deterioration and moral decadence<sup>1,13</sup>.

More worrying is that most of the social problems in the country are related to the substance abuse among the youth. This phenomenon is also spreading in educational institutions as early as in primary schools, secondary schools, and in higher learning institutions. The Perlis National Anti-Drugs Agency Director<sup>2</sup> also shared that they have arrested 7 teenage boys aged between 15 to 21 including a university student, together with 30 other users of substance abuse including drugs in the "Prime Operation" which was carried out for three days. She added that dealers nowadays supplied and sold these prohibited substances online and used applications such as WhatsApp and WeChat besides using budget hotels as their main rendezvous. Therefore, this matter has to be taken seriously by all parties because involvement in prohibited substances

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including drugs can cause other social problems such as stealing, rape, blackmail, gangsterism, vandalism, and murder and finally impacts individuals (students), society and the nation in the long run.

The use of prohibited substances, especially drugs is starting to threaten our nation. This situation is distressing all parties as substance abuse can leave various negative effects to its users, their families, the society and the nation. Among the negative effects are truculence, beating, and stealing, robbing, increase in divorce cases, involvement in crime and dealing and processing prohibited substances. There are also chronic cases such as murder as a result of being under the influence of prohibited substances. Seeing that the trend of substance abuse is rampant among the youth, it is important that the youth especially higher learning institution students are aware and know about the types of prohibited substances, the danger or negative effects and the factors that cause individuals to get involved in substance abuse. Knowledge about these substances is important as early awareness for students about the dangers of using these substances so that they can say “no” to these prohibited substances including drugs. The knowledge on the dangers of substance abuse has to be nurtured from the beginning. The time span between childhoods to teenage years is the time of problems and unrest followed by various challenges. When these teenagers start to feel depressed, they start to find easy solutions like using prohibited substances<sup>3</sup>. Therefore, it is important to expose teenagers and youth to help with cognitive development and give them a more positive perception in life.

Therefore, the researcher would like to study the awareness of Universiti Utara Malaysia (UUM) students especially students at the School of Creative Industry Management and Performing Arts (SCIMPA) about the types, experience of peer involvement, and factors that lead to using prohibited substances and indirectly give early exposure to them about the negative effects of using prohibited substances so as to lower the risk of their involvement in UUM.

## METHODOLOGY

This study is a survey and is a quantitative study. A number of 159 students were chosen by simple random sampling from the SCIMPA in UUM. In order to collect the data for this study, a study instrument in the form of a questionnaire from was used<sup>1</sup>.

**Research Instrument:** For the purpose of this study, a questionnaire was used by the researcher because it is suitable to fulfil the objectives of the study and the items have good reliability. The questionnaire has three parts; part A that covers the respondents’ demographic information, part B, which is about the knowledge and experiences about prohibited substances and part C which is about knowledge of predisposing factors that lead to the use of prohibited substances<sup>1,4</sup>.

Part A contains demographic information which consists of ten items. The items include sex, age, race, and course, year of study, hometown and religion. Besides that, items about family income, parental marriage status, and respondents’ current academic performance are also included. Meanwhile, part B contains items that measure respondent’s knowledge on the types of prohibited substances use which are opium, morphine, heroin, codeine/cough medication, cannabis, ketamine, ecstasy pills, methadone, eramine 5, methamphetamine, depressants, kratom, and other pills. This part also contains items to do with their experience touching drugs and awareness of friends involved in using prohibited substances. Students need to mark their answers in the designated spaces with either “yes” or “no”.

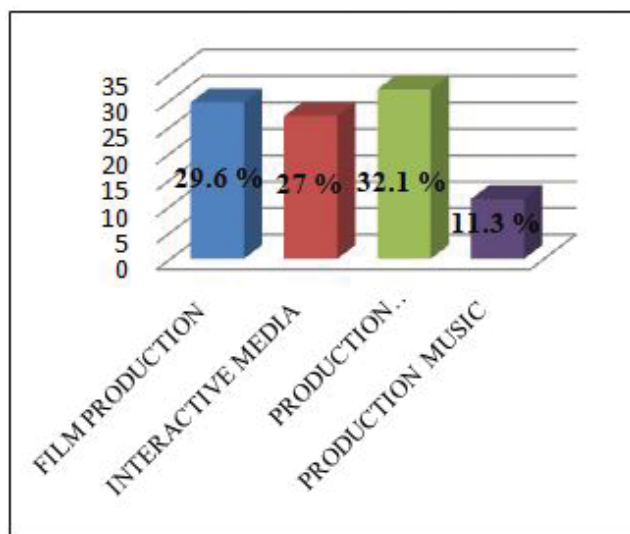
Part C contains six items on the respondent’s view on the predisposing factors leading to the involvement of individuals with prohibited substances. It includes six main factors which is curiosity, peer pressure, accidental, family problems, overcoming pressures of life, and recreational purpose. This item measures whether respondents are aware and know the predisposing factors leading to involvement with prohibited substances. In this section, respondents need to answer using the five point Likert scale ranging from very important, important, not sure, unimportant, and very unimportant.

**Pilot Test:** The obtained data is then analysed using the descriptive test through the Statistical Package for Social Science Software (SPSS) version 22. The final result found that a majority of the students are aware on the use of prohibited substances and the effects on the individuals using it. Most of them also report awareness on using prohibited substances such as kratom and cough medication<sup>6</sup>. However, results also show that students have less awareness on prohibited substances such as opium, morphine, depressants and other pills because they seldom hear of it. Besides that, respondents also reported of being aware of peer pressure as the main

reason of involvement in prohibited substances abuse. Respondents are also aware of the negative effects of prohibited substances use.

### RESULTS AND DISCUSSION

**Respondent’s Profile According to Course:** Figure 1 shows the number of respondents according to the programmes offered by the SCIMPA. A number of 159 students from the SCIMPA program were randomly picked as respondents in this study. Out of all the students, 47 (29.6%) of the students are from Film Production, followed by Interactive Media Production with 43 people representing 27%, 51 students from Production Animation representing 32.1% which is the highest amount and 18 respondents chosen from Production Music representing 11.3%.

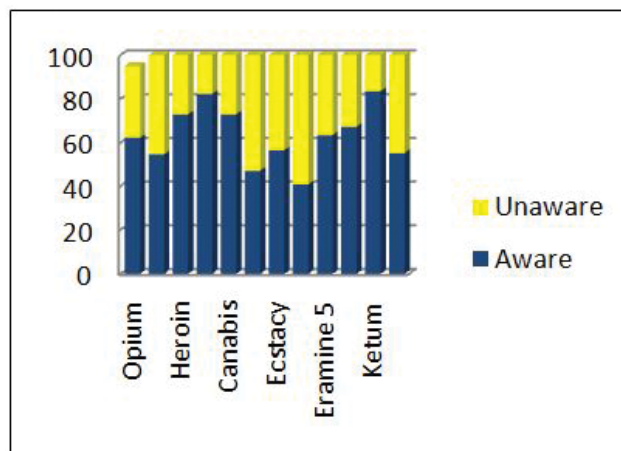


**Figure 1: The Percentage Number of Students According to Programme**

**Awareness on Substance Abuse:** Figure 2 displays the percentage of Creative Industry Management and Performing Arts students’ awareness on the types of prohibited substances and their effects. A majority of the students know that opium, morphine, heroin, cough medication, are prohibited substances<sup>7</sup>. However, study results show that not many are aware that methadone and ketamine are prohibited substances because percentage is lower than 50%.

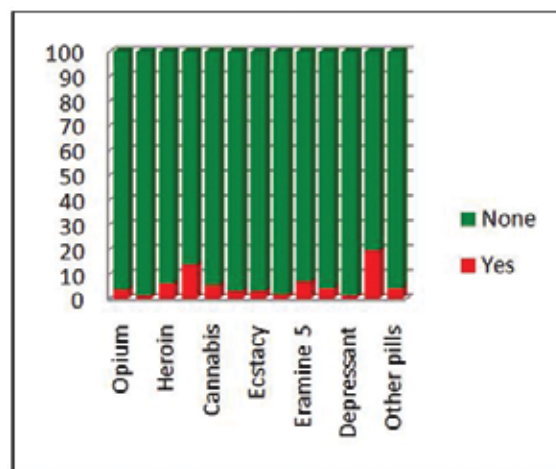
Regarding the effects of using prohibited substances, 83.6% (133 students) agree that use of kratom can have negative effects on the user. Followed by 82.4% (131 students) who realize that taking cough medication

without control can cause negative effects. Besides that, to measure awareness on other prohibited substance use, 116 students admit that heroin and cannabis are dangerous, eramine 5 (101 students), 99 admit that opium is dangerous, ecstasy (90 students), morphine (87 students), and ketamine (75 students). Only 65 students reported that methadone gives a negative effect<sup>8-10</sup>.



**Figure 2: The Percentage of Student’s Awareness on Prohibited Substances**

**Student’s Awareness on Peer Involvement in Using Prohibited Substances:** Figure 3 shows student’s awareness on peer involvement in using prohibited substances. The study shows that 19.5% (31 students) admit having friends who use kratom. Meanwhile, 13.8% (22 students) admit having friends who are involved in cough medication abuse, followed by opium 3.8% (6 students), heroin 6.3% (10 students) and cannabis 5.7% (9 people). The rest admit that they are aware their friends are using prohibited substances such as ketamine, ecstasy, methamphetamine and other pills<sup>11-12</sup>.



**Figure 3: Percentage of Student’s Awareness on Peer Involvement in Prohibited Substances Use**

Overall, the students of SCIMPA, UUM are aware of the types of prohibited substances and the negative effects when using it. However, students are more aware of cough medication and kratom probably because many cases have become viral on social media recently. In addition, it has become the recent trend as these substances are easily obtained and are cheaper. Students are less aware of other prohibited substances such as ketamine, heroin, eramine 5, and others probably because lack of exposure about these substances and its effects. These findings are in line with that which states that the awareness of students in higher learning institutions is still low<sup>1</sup>.

Besides that, research results prove that most students have friends that use prohibited substances, especially kratom and cough medication. Student's involvement in kratom and cough medication is higher compared to other items. This is probably because they do not know that taking kratom and cough medication in excess without doctor's advice can cause addiction and cause negative effect towards one's health physically, mentally and psychologically<sup>4</sup>. Kratom and cough medication are used widely because it is easily obtained and can be used as a traditional treatment. This is parallel to the found that individuals who are involved in drugs, especially those who are using heroin and morphine have potential to display aggressive behaviour<sup>5</sup>.

Therefore, everyone especially the administration of UUM has to take this report seriously. This is because there are many negative effects when using these substances such as skipping class, vandalism, loss of attention, stealing or robbing. In conclusion, many students are involved in using prohibited substances such as kratom and cough medication. Besides that, there are also students who are involved in using prohibited substances such as opium, morphine, heroin, cannabis, ketamine, ecstasy, methadone, eramine5, methamphetamine, depressants and other pills. The use of these prohibited substances can cause problems such as weak memory, physical problems and also psychological problems that can disrupt their life. Besides that, prohibited substance use also causes aggressive behavior and worse, the user might also get involved in crime while under the influence of prohibited substances.

Therefore, programs should be organized and posters should be distributed to provide information and exposure about the negative effects of prohibited

substances. To curb this problem, UUM administrators have to come up with more awareness programs and ask UUM Security Unit to impose compound on those who break the rules. This exposure is important to reduce cases or risk of prohibited substances abuse.

## CONCLUSION

The use of prohibited substances among UUM students has to be curbed. Therefore, more research on substance abuse is needed in future and the scope of study has to be expanded by using a larger sample size. Continuous research is important to look at the trend among students on campus so as to come up with a suitable intervention plan.

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# The Effect of Residence Area on Motor Skill Development among Children

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## ABSTRACT

Environmental influences such as residence effect on athletic talent identification and development have become an interest topic for sport scientists. Residence effects occur when being live in a certain city size leads to participation or performance advantages, typically for those live in smaller or mid-sized cities. The purpose of this study was to examine the effect of the child's residence area on child's motor development. A total 928 boys (aged  $7.36 \pm 0.29$  year) and 1093 girls (aged  $7.37 \pm 0.29$  year) was randomly selected from 215 primary schools in Selangor, Malaysia. With respect to their type of residence area, 110 schools located in urban area and 115 schools located in rural area. They were tested on the two anthropometric measurement (weight and height) and four motor subscales (power, flexibility, speed and coordination). Result showed that children from urban area tends to have higher anthropometrics and better motor skill development. It also suggested that child's residence structure plays an important role in motor skill development, and that these structures are influenced by certain city-sized and people lifestyle.

**Keywords:** Motor skill, Residence effect, Rural-urban, Talent identification

## INTRODUCTION

Motor fitness is an important part of the overall development process of children, especially during the early years of schooling<sup>1</sup>. Motor fitness and poor social skills in childhood can have a long-term negative impact on the optimal development of children<sup>2</sup>. Many previous studies have supported the importance of developing early childhood motor skills that should be effective<sup>3</sup>.

General system theory describes the development of human being influenced by various factors that

can affect the development of children, which include the characteristic of guardians, family, environment and culture generally<sup>4</sup>. Some environment factors that are associated with an increasingly critical child's development was especially early childhood changes and learning environment changes<sup>5</sup>. The family economic factor, which is the indicator of a family's ability to provide home facilities or infrastructure, can directly or indirectly affect the child's development<sup>6</sup>. This factor is also closely related to the choice of parents to live in urban or rural areas. A child may spend a lot of time outdoors and indirectly they are exposed to the influence of the neighborhood environment in which he lives and the school they attend. In childhood, neighborhood environments become part of the direct impact of its cognitive stimuli and thus can affect motor development. In addition, the factors of residence also benefit the development of children when parents send their children to childcare centers and preschools<sup>8</sup>. Undeniable, quality care centers and pre-schools are mostly located in urban areas.

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Living in areas distinguished by size of the population can be attributed to differences in eating habits, access to sports facilities, and opportunities for physical fitness activities<sup>9-10</sup>. Such factors indirectly can affect the motor abilities development of children in that particular area. It was found that living area has a positive effect on the development of physical fitness in children in terms of significantly better performance increments for children living in urban compared to rural areas<sup>11</sup>. The lack of information regarding to strong and weakness factor of motor skill among rural-urban children tends to contribute as constraint in optimizing children health. Thus, the principal aim of the current study was to examine potential differences in aspects of motor abilities among children living in urban and rural settings. Besides that, the potential influence of the child's residence area on gross and fine motor skill development of preschool-aged children in particular region in Malaysia was examined.

**MATERIALS AND METHOD**

**Study Area:** This study had covered rural-urban in Selangor, one state in Malaysia. This study focused on children age seven years old in primary school at selected towns in urban and rural areas of Selangor. The location of rural and urban school involved in this study were shown in Figure 1.

**Participants:** A total 928 boys and 1093 girls aged seven years was selected from 215 primary schools in Selangor, Malaysia. With respect to their type of residence area, 110 schools located in urban area (599 boys and 667 girls) and 115 schools located in rural area (329 boys and 426 girls). They were tested on four motor subscales which is power, flexibility, speed and coordination.

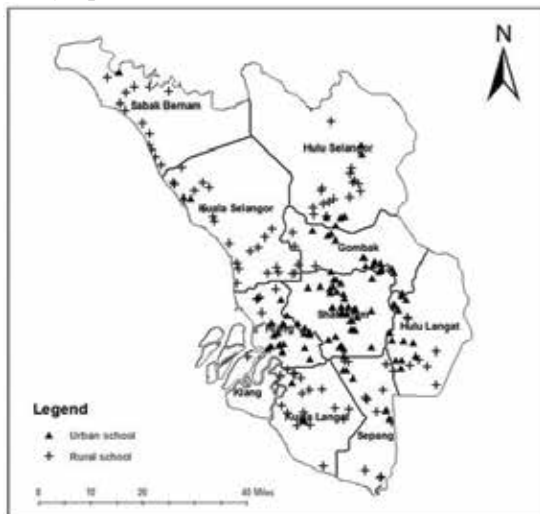


Figure 1: Location of Rural-Urban Schools in Selangor

**Anthropometrics and Motor Component Variables:** Anthropometric measurement involved in this study were included weight and standing height. While motor component involved lower limb strength (standing broad jump), flexibility (sit and reach), hands-eye coordination (hand wall toss) and speed (20 meter run).

**Preprocessing Data:** For matrices that have very small amounts of data lost (~ 3%) than the overall data recorded, the nearest neighbouring method can be used. This method examines the distance between each point and its nearest point<sup>12-13</sup>.

**Principal Component Analysis (PCA):** PCA is a common technique for finding patterns in data of high dimension<sup>14</sup>. The idea behind of PCA is by which numbers of correlated variables are transformed into a smaller number of uncorrelated variables<sup>15</sup>. Two main aims of PCA were to reduce the large quantity of data and extracts discriminatory principal components that characterize and functionally interpret different patterns<sup>16</sup>. With the use of PCA, it became possible to identify all the differences obtained with the parametric variables, and it was still possible to identify the location in the landing cycle where the differences between tasks could be explained. PCA also was functioned to analyze an athlete's technique, and then used to determine the mean posture and principal movements carried out by the athletes. It can be used to compress a high dimensional dataset into a lower dimensional dataset. Recent study also revealed PCA is particularly useful when data on a number of useful variables has been gathered, and it is plausible that there is some redundancy in those variables<sup>17-18</sup>.

**RESULTS AND DISCUSSION**

**Effect of Residence Area on Motor Skill of Children:** Table 1 shows the descriptive statistic of mean for rural-urban boys and girls.

Table 1: Mean Statistics of Rural-Urban Selected Participants

Statistic	Boys		Girls	
	Rural (N = 329)	Urban (N = 599)	Rural (N = 426)	Urban (N = 667)
Wg (kg)	20.4	20.4	24.1	24.4
Hg(cm)	118.0	118.0	123.4	124.8

Conted...

SBJ (cm)	114.4	114.4	105.3	106.5
SAR (cm)	26.4	26.41	27.8	29.1
HWT (no.)	6	6	6	5
20MR (s)	4.61	4.61	4.84	4.92

**Note:** Wg: Weight; Hg: height; SBJ: standing Broad Jump; SAR: Sit and Reach; HWT: Hand wall Toss; 20MR: 20 meter Run

The analysis of variance (refer Table 2) for boys showed no interaction between rural-urban residence area in coordination scale ( $F = 1.112$ ;  $p = 0.292$ ) and speed scale ( $F = 1.336$ ;  $p = 0.248$ ). The significant main effects were found for weight ( $F = 43.338$ ;  $p < 0.001$ ), height ( $F = 43.901$ ;  $p < 0.0001$ ), standing broad jump ( $F = 4.806$ ;  $p < 0.029$ ) and sit and reach ( $F = 75.554$ ;  $p < 0.0001$ ). Meanwhile, analysis of variance for girls revealed four out of six parameters were significantly differentiate rural-urban. There are height ( $F = 41.536$ ;  $p < 0.0001$ ), sit and reach ( $F = 34.072$ ;  $p < 0.0001$ ), hand wall toss ( $F = 13.680$ ;  $p < 0.000$ ) and speed ( $F = 5.252$ ;  $p < 0.013$ ). Otherwise, the non-significant parameters are weight ( $F = 2.584$ ;  $p = 0.108$ ) and standing broad jump ( $F = 1.679$ ;  $p = 0.195$ ).

**Table 2: Analysis of Variance of Rural-Urban Selected Participant**

Variables	Boys		Girls	
	F	Pr > F	F	Pr > F
Wg	43.338	<0.0001	2.584	0.108
Hg	43.901	<0.0001	41.536	<0.0001
SBJ	4.806	0.029	1.679	0.195
SAR	75.554	<0.0001	34.072	<0.0001
HWT	1.112	0.292	12.68	<0.0000
20MR	1.336	0.248	6.252	0.013

**Note:** Wg: Weight; Hg: height; SBJ: standing Broad Jump; SAR: Sit and Reach; HWT: Hand wall Toss; 20MR: 20 meter Run

**Comparison of Compositional Pattern of Rural-Urban Effect:** Principle component analysis was applied on six parameters of the data set to determine the major effects of the variation in each rural-urban area to the child's motor skill development. The results of the PCA loadings after rotation (VF) for boys and girls are shown in Table 3. The threshold of 0.70 was fixed to indicate as strong factor loading that were selected for further interpretation.

Among boys, three VFs were obtained for the rural and urban area, with eigenvalues larger than 1 summing almost 62.39% and 62.42% of the total variance in the data set, respectively. The first component of rural effect consists of flexibility (sit and reach). The second component consist of strength (standing broad jump) while third component consist anthropometric component weight. Comparing the factor loading for urban area, the first component consists of anthropometric (weight and height), second component consist of strength and speed (20 meter run) and third component consist of coordination (hand wall toss).

Among girls, two VFs were obtained for the rural and urban area, with eigenvalues larger than 1 summing almost 52.44% and 46.28% of the total variance in the data set respectively. The first component of rural effect consists of anthropometric (height) and the second component consist of strength (standing broad jump). Comparing the factor loading for urban area, the first component consists of anthropometric (weight) and second component consist of speed (20 meter run).

**Table 3: Factor Loading After Varimax Rotation of Rural-Urban Among Participants**

Area	Rural			Urban		
	VF1	VF2	VF3	VF1	VF2	VF3
Boys						
Wg	-0.20	0.16	0.79	0.76	-0.04	-0.16
Hg	-0.62	-0.25	-0.03	0.78	-0.03	0.14
SBJ	0.25	0.76	-0.09	0.36	0.70	0.07
SAR	0.80	-0.06	-0.06	0.30	0.28	-0.56
HWT	0.24	-0.33	0.68	0.09	0.10	0.83
20MR	-0.46	0.67	0.12	0.40	-0.74	0.01
Eigen.	1.47	1.26	1.01	1.58	1.14	1.03
Var. (%)	24.5	20.9	16.8	26.2	18.9	17.2
Cum. (%)	24.5	45.5	62.3	26.2	45.1	62.4
Girls						
Wg	0.68	-0.37		0.70	-0.04	
Hg	0.76	-0.04		0.68	0.17	
SBJ	-0.33	0.70		-0.52	0.43	
SAR	0.21	0.62		-0.38	0.30	
HWT	0.62	0.29		0.22	0.67	
20MR	0.01	-0.68		0.10	-0.77	
Eigen.	1.78	1.37		1.57	1.20	
Var. (%)	29.6	22.7		26.2	20.1	
Cum. (%)	29.6	52.4		26.2	46.2	

**Note:** Wg: Weight; Hg: height; SBJ: standing Broad Jump; SAR: Sit and Reach; HWT: Hand wall Toss; 20MR: 20 meter Run



## DISCUSSION

This study is concerned with the impact of children's residential area on the development of children's motor skills. The results of the analysis show that the development of preschool children motor skills is very significant with the type of residence they live in. This decision is consistent with the general system model that describes the development of children related to environmental interaction. The results of the present study suggest that children living in urban areas have better motor skill performance than rural areas. This factor is very much related to the economic position of parents living in the city<sup>2</sup>. Higher urban economic factors allow children to stay in a stimulating home environment. They may have more numbers of toys. They are also more vulnerable to developing skills such as fine motor skills, which are useful for school use. This is supported by previous researchers who acknowledge the fitness of a better hand motor associated with the availability of more suitable game materials<sup>19</sup>. Homes that may have better facilities and infrastructure can encourage children to play.

A clear explanation of the performance of children living in the urban area is better than rural children is that most urban children have been sent to day care centers and kindergartens from a very young age. As a result, activities that develop hand muscles and smooth movements become faster as daily practice in a more systematic and objective daycare and nursery center<sup>20</sup>. It has been reported in another study that children who are offered adequate infrastructure and equipment and appropriate care will have more opportunities for proper motor development<sup>21-22</sup>. The escalating mood during the early stages of the child is the key determinant for later motor development<sup>23</sup>. The use of recreational activities in the training of gross and smooth motor abilities and a safe environment and appropriate opportunities support the development of regular motor<sup>24</sup>. The role of educators and parents is important in promoting motor skills. To ensure these skills, a satisfying learning environment must be provided, not only in cognitive and affective domains, but also in psychomotor domains. Therefore, parents and educators should set up large outdoor and indoor play areas and use teaching practices that promote the development of children's motors through sports activities and games related to their daily reality. Positive support for the development of coarse and fine motor skills during pre-school age can enhance the development process.

## CONCLUSION

In conclusion and within the study's limitations, it is suggested that the place of residence has clear impact on motor fitness of boys and girls school children. Among boys, children lived in urban area significantly higher in physical, strength and flexibility compared with rural children may indicate lower habitual physical activity level in rural children. Meanwhile, among girls, children from rural area significantly have advantage in coordination and speed.

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# Physical Fitness and Anthropometric Characteristics in School Children: A Comparison of Urban and Rural Areas in East Coast of Peninsular Malaysia

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## ABSTRACT

The objective of the study is to compare physical fitness between urban and rural school children and to determine relationship between body mass index and physical fitness primary school children in east coast of Peninsular Malaysia. This study is a cross-sectional study and conducted in primary schools. Anthropometric measurement involved weight and height measurement, and body mass index (BMI) calculation. Fitness test that were measured are power and flexibility. Power was measured by using Standing Broad Jump (SBJ), and flexibility test was measured using Sit and Reach Test (SRT). Total number of subjects were 14880, 71% (n=10532) were classified in normal BMI, and remaining 10% (n=1423) were in obesity; 9% (n=1303) were overweight, 8% (n=1164) were underweight; and 3% (n=458) were in severe thinness. In school area category, 59% (n=8769) rural school children and 41% (n=6111) urban school children. In conclusion, the current study found flexibility had shown a difference in area of school where urban school children performed slightly better than that of rural with F-value 2.09 (Pr>F= 0.15; p<0.05). It also showed a significant negative correlation between BMI and power (r= - 0.12) with p-value was 0.0001. However, there was no significant difference in power with areas of school, and no correlation between flexibility and BMI.

**Keywords:** *Body mass index, Fitness, Flexibility, Power, Primary school children*

## INTRODUCTION

Physical fitness and activity are influenced by many factors such as environment, socioeconomic status, interpersonal barriers, interpersonal relationships and urban/rural dwelling<sup>1-2</sup>. Low physical activity among children nowadays is due to changes in lifestyle. Sedentary lifestyle has spread in our generation due to evolvement of technology; electronic gadget and other

technologies which involve less physical movements in everyday life<sup>3-4</sup>. Parents nowadays tend to give electronic gadget to their children. Therefore, most of their children might reduce in physical activity compare to those who do not have those gadget, they are tend to spend their activity with their neighborhood friends and play at playground<sup>3-5</sup>.

Few western studies showed significant differences in physical fitness and activity levels between urban and rural children<sup>6-7</sup>. In Asia, many studies have shown a significant difference between those two groups of population, where the rural population presented better physical fitness compare to urban population<sup>8-9</sup>. However, those studies used different types of physical fitness tests. The results might show just a part of physical fitness component such as in this study<sup>8</sup> they

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measured flexibility and cardiovascular performances, whereas there other category that need to be included to evaluate physical fitness such as strength, speed agility and coordination.

In Malaysia, there is a program named National Fitness Standard (SEGAK) assessment test. The program is a standard physical fitness test aims to assess physical fitness level in both primary and secondary school students. The test is a mandatory test which is carried out twice a year by physical or health education teachers in schools. There are five components; body mass index, step-ups, push-ups, partial curl-ups, and sit and reach tests<sup>5</sup>. However, the tests measured are only for determination of fitness status, it does not compare between groups like rural and urban school areas. Furthermore, in the SEGAK program, it tests only for age of 10 years to 17 years old. Thus, in this recent study, objectives of the study is to compare physical fitness of urban and rural school children in east coast of peninsular Malaysia and to determine relationship between body mass index and physical fitness of the school children.

## METHODOLOGY

This study was a cross-sectional study and conducted in primary schools in Malaysia. The pupils from those schools were chosen randomly and a school teacher from their school conducted the tests according to the research methods. Urban and rural schools were categorized according to the total population of the area of schools. According to Department of Statistics Malaysia<sup>11</sup>, urban is categorized as population of 10,000 people and above, whereas rural is categorized as population less than 10,000 people.

Sample size was determined by random sampling method. Calculation of sample size had been done using G-Power software 3.1.9.2.

To reduce error while conducting the research, inclusive criteria included in this study. These include born in the same year (2008) and studied in the same standard in those primary schools (Standard 1). The exclusion criteria were history of chronic diseases and illnesses that affect lungs, heart and physical functions, any present of respiratory symptoms such as cough and dyspnea at the time they were tested, they were born in other than 2008, and were not in Standard 1. There were 4030 school children were tests in this study. They were pupils in 57 primary schools in 8 districts in Terengganu.

Anthropometric measurement involved weight (kilogram-kg) and height (meter-m) measurement, and body mass index (BMI) calculation. Participant's weight was measured using standardised electronic digital scale<sup>12</sup>, and the height was measured using a standardised stadiometer. BMI was calculated by dividing weight by the square of height ( $BMI = \text{weight}/\text{height}^2$  ( $\text{kg}/\text{m}^2$ ))<sup>13-14</sup>. BMI that had had been calculated then were categorized in underweight/thinness, normal, overweight and obese, according to age percentile and was developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion<sup>15</sup>.

Power was measured by using Standing Broad Jump (SBJ). Subjects stood behind a line with feet slightly apart and then jumped forward to the farthest distance with both feet simultaneously take off and land on respectively. The measurement was taken in centimeters<sup>14</sup>.

Flexibility test was measured using Sit and Reach Test (SRT)<sup>12</sup>. The test was using a box that had a measurement scale in centimeters (cm). As starting position, the subject sat in long sitting position: hip flex in 90 degree, knee was extended to 0 degree and ankle is 90 degree position with sole of foot rest flat on the box vertically. The subject then was asked to do trunk forward flexion with arm reach. The measurement was taken at the longest finger can be reached or the highest distance that the subject can reach<sup>8</sup>.

Data were analyses using XLSTAT 2014. Significance level was set at  $P < 0.05$ . Descriptive statistics were obtained for the absolute values of each tests and measurements. Descriptive statistics were obtained for the absolute values of each tests and measurements. There were age during the test being conducted, height, weight, BMI, power, and flexibility. Interferential statistic used in this study was one-way analysis of variance (ANOVA) to test differences between school area (urban and rural) and each physical fitness tests conducted (SBJ and SRT) as well as BMI. Next, to determine relationship between BMI and each physical fitness tests that had been conducted (SBJ and SRT) was measured by using Pearson correlation & simple linear regression analysis.

## RESULTS AND DISCUSSION

Total numbers of subjects were 14880 pupils. In Table 1, there were 7999 (54%) males and 6881 (46%)

females. Among the total numbers of the subjects, 71% (10532) were classified in normal BMI, and remaining 10% (1423) were in obesity; 9% (1303) were overweight, 8% (1164) were underweight; and 3% (458) were in severe thinness. In school area category, 59% (n=8769) rural school children and 41% (n=6111) urban school children.

This study means of BMI, were in urban was 15.97 (SD=3.61), and in rural 15.59 (SD=3.02). The result using ANOVA (Table 3) showed a significant difference with F-value 12.97 (Pr>F= 0.00; p<0.05). The current study showed a better in BMI in rural group compare to urban group. Next, means of power using SBJ test (Table 3), were 100.55 (SD=19.39) in urban and 101.42 (SD=18.70) in rural area. The result from ANOVA showed no significant difference with F-value 2.09 (Pr>F= 0.15; p>0.05). In terms of flexibility, the means of flexibility using SRT test (Table 4), were in urban was 27.38 (SD=4.37), and in rural 26.85 (SD=4.73). The result from ANOVA showed a significant difference with F-value 13.78 (Pr>F= 0.00; p<0.05) as in Table 3. It showed that flexibility in urban area is better than rural school children.

In Table 5, the result of correlation between BMI and power showed a negatively correlation between BMI and power ( $r=-0.12$ ) with p-value less than 0.01 (0.0001). It means, as BMI has increased, the power will be reduced. Next, result of correlation between BMI and flexibility showed no correlation between BMI and flexibility ( $r=0.025$ ) with p-value more than 0.05 (0.109).

The results of the current study were analyzed and compared. In terms of comparing school area and location, between urban and rural school children, there are several studies across Asia<sup>8, 16</sup>. Previous study<sup>16</sup> results showed mean of BMI in urban is slightly higher (M= 18.35, SD = 3.26) than in rural area (M=17.67, SD= 3.00). Compare to the current study urban area and rural area showed a significant difference with F-value 12.97 (Pr>F= 0.00; p<0.05) in mean of BMI (urban, M=15.97, SD=3.61; rural, M=15.56, SD=3.02). Research<sup>8</sup> however showed a significant level (p=0.001, p<0.05), with mean of BMI for urban was 16.97 (SD=3.01) and rural area was 14.31 (SD= 2.21) for age 9-13 years old school children. In addition, compare to both studies in China and Malaysia, it<sup>8</sup> showed the Indian had lower BMI and towards 5<sup>th</sup> percentile in CDC growth charts especially in rural area.

The purpose of the current study was to evaluate and compare physical fitness of urban and rural school children. In the current study, there was no difference between power and these two locations. Power did not influence by the urban or rural lifestyles because of they performed almost the same each other<sup>19-23</sup>. In terms of power using SBJ test, previous study<sup>16</sup> showed a difference in mean of standing broad jump, which measured power (urban, M=173.76, SD= 29.62; rural, M=176.44, SD=28.53). They concluded, urban children living in rural area, more likely to have not achieved the fitness standards. However, the study compared between age in junior middle school (M=13.3). They did not evaluate primary school children in the test.

In flexibility test using SRT, it showed a significant difference (p=0.001, CI=95%) where rural school children were more flexible compare to their urban school children<sup>8</sup>. In the current study however vice versa, it showed a significant difference between urban and rural school with F-value 13.78 (Pr>F= 0.00; p<0.05), urban school children showed a better performance compared to rural school children. This result showed, their lifestyles and daily activities might not affect their flexibility performance. In addition, result of the current study showed a greater flexibility<sup>8</sup> (urban M=21.58, SD=6.19; rural M=23.42, SD=6.09).

In the second purpose, this study revealed the relationship between BMI and each fitness test. The result showed a negatively significant difference in power and no significant in flexibility. In previous study<sup>17</sup>, they determine the relationship between physical fitness and BMI<sup>17</sup>. In the study, they performed SBJ as one of the fitness tests. In addition, their samples were involved 7-year-old children. The study showed a negatively correlated between BMI and physical fitness and it was more pronounced in older children. In another study<sup>18</sup>, they assessed the effects of BMI categories with overall fitness scores. They found that a statistically significant correlation between BMI categories and the overall fitness score (p<0.05). It showed that those who have normal BMI perform better than that of in overweight and obese categories. The current study used mean of BMI and percentage of normal BMI were highest and that might causes less or no significant correlation between BMI and power and flexibility respectively.

**Table 1: Demographic Data of Samples and Separated By Gender, School Area, State, and Body Mass Index Categories**

	Sample Size (n)	Percentage (%)
<b>Gender</b>		
Male	7999	54
Female	6881	46
<b>School Area</b>		
Urban	6111	41
Rural	8769	59
<b>Body Mass Index Class</b>		
Normal	10532	71
Obesity	1423	10
Overweight	1303	9
Underweight	1164	8
Severe thinness	458	3

Note: <sup>a</sup>kilogram <sup>b</sup>meter <sup>c</sup>kilogram per meter<sup>2</sup>

**Table 2: Mean and Standard Deviation of Anthropometric Characteristics of Samples and Separated By Gender, School Area, and Body Mass Index Categories**

	Weight (kg <sup>a</sup> )	Height (m <sup>b</sup> )	Body Mass Index (kg/m <sup>2</sup> <sup>c</sup> )
<b>Gender</b>			
Male	22.9 ± 6.3	1.19 ± 0.1	15.9 ± 3.5
Female	22.2 ± 5.7	1.19 ± 0.1	15.6 ± 3.1
<b>School Area</b>			
Urban	23.2 ± 6.5	1.2 ± 0.1	16.0 ± 3.6
Rural	22.1 ± 5.7	1.2 ± 0.1	16.0 ± 3.0
<b>Body Mass Index Class</b>			
Normal	20.8 ± 2.5	1.2 ± 0.1	14.8 ± 1.1
Obesity	35.9 ± 6.9	1.2 ± 0.1	23.3 ± 3.5
Overweight	26.9 ± 3.0	1.2 ± 0.1	18.3 ± 0.8
Underweight	17.5 ± 1.6	1.2 ± 0.1	12.6 ± 0.3
Severe thinness	15.9 ± 1.6	1.2 ± 0.1	11.4 ± 0.9

**Table 3: Mean, Standard Deviation, F-Value and Pr>F Value of Body Mass Index (BMI) and Power in School Area; Urban and Rural**

School Area	Body Mass Index (kg/m <sup>2</sup> ) <sup>a</sup>		Power (cm) <sup>b</sup>	
	Mean (SD)	F-Value (Pr>F)	Mean (SD)	F-Value (Pr>F)
Urban	16.0 ± 3.6	13.0(0.00)*	100.6 ± 19.4	2.09(0.15)
Rural	15.6 ± 3.0		101.4 ± 18.7	

<sup>a</sup>kilogram per meter<sup>2</sup>, <sup>b</sup>centimeter, \*p<0.05

**Table 4: Mean, Standard Deviation, F-Value and Pr>F Value of Flexibility in School Area; Urban and Rural**

School Area	Flexibility (cm) <sup>b</sup>	
	Mean (SD)	F-Value (Pr>F)
Urban	27.4 ± 4.37	13.8 (0.00)*
Rural	26.9 ± 4.7	

Note: <sup>a</sup>kilogram per meter<sup>2</sup>, <sup>b</sup>centimeter, \*p<0.05

**Table 5: Correlation Test between BMI and Power, and Flexibility**

	Power		Flexibility	
	r	p*	r	p
Body mass index	-0.12	<0.0001	0.025	0.109

Note: \*p<0.01

## CONCLUSION

In conclusion, the current study found relation of school area and BMI were related to specific fitness test. In this study flexibility had shown a difference in area of school where urban school children performed slightly better than that of rural. It also showed a significant negative correlation between BMI and power. However, in power, it was not significant related to areas of school and no correlation with BMI. This result showed, their lifestyles and daily activities might not be too much different to each other. Those who are living in the urban areas in Terengganu, might have same activities such in rural areas, and in Terengganu, the urban area itself, is not like as metropolitan city, Kuala Lumpur. In addition, further research need to perform, to differentiate their actual daily activities rather than their location of living itself. Instead of that, for future study, it is suggested to find differences in body mass index categories such as overweight rather than measure only mean of BMI.

**Recommendations:** In future, there should be a study that focus on teenage as teenage years could be a start of different anthropometric characteristics as physically different between both males and females.

**Ethical Clearance:** Nil

**Source of Funding:** Self

**Conflict of Interest:** Nil

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# Removal of Arsenic Compound in Jordan, Yarmouk and Zarqa Rivers Using Coagulation Techniques

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## ABSTRACT

In this study, the effectiveness of coagulation was assessed in arsenic removal from the Zarqa, Jordan and Yarmouk River. Graphite-Furnace Atomic Absorption Spectrophotometry (GF-AAS) technique was used to analyse the arsenic percentage. The Zarqa River recorded the highest arsenic value at upstream and had the lowest value at downstream. The highest percentage of arsenic content in the Zarqa River is 69.81 ppb while the Yarmouk River showed the lowest concentration (7.003 ppb) before the coagulation process. Reduction in the concentration of arsenic was achieved up to 57.001 ppb for Zara River and 5.91 ppb for Yarmouk River after the coagulation test. This indicates that the coagulation technique significantly able to remove up to 20% of arsenic content.

**Keywords:** Coagulation, Arsenic, Zarqa River, Yarmouk River, Jordan River.

## INTRODUCTION

Arsenic is a semi-metallic chemical element with the symbol 'As', having the atomic number 33 and relative atomic mass 74.92. This element is a metalloid and placed in the VA group of the periodic table together with nitrogen, phosphorus, antimony and bismuth. In addition, arsenic has four chief chemical forms of -3, 0, +3, and +5 oxidation states<sup>1</sup>. The sources of environmental arsenic may consequential from different of natural sources phenomena such as volcanic marine sedimentary rocks, fossil fuels, minerals erosion of rocks and anthropogenic activities including mining, agricultural and chemicals industry activities such as paints and dyes. Nowadays, people tend to misuse the arsenic's toxic properties in pesticides and wood medications<sup>2-4</sup> which eventually

give disadvantages to the environment and human life. A few advancements are compelling in bringing down arsenic content especially in watery arrangements, for instance, coagulation/precipitation, particle trade adsorption forms, osmosis, oxidation, ion exchange, ozonation and electro dialysis<sup>5</sup>.

Arsenic is a famous poison and become one of the world's paramount environmental hazards, looming the lives of a number of hundred million people. Long-term contact to low levels of arsenic in food and water creates a broad array of consequences on human health that are often defined by the catch-all term arsenicosis<sup>6</sup>. Early signs are non-specific effects such as muscular weakness, lassitude and mild psychological effects. These are followed by distinguishing skin ailments and a lot of diseases of the liver and kidney, cardio-vascular and peripheral vascular diseases, neurological effects, diabetes and chronic and acute lung disease and thus to death<sup>7</sup>. The World Health Organization (WHO) portrayed the situation in Bangladesh as 'the largest poisoning of a people in history'. It is estimated that in 1998-99 about 27 million people were drinking water having more than the national standard of 50 parts per billion (ppb) of arsenic.

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This total keep increase another 6 million people when included the area of West Bengal in India<sup>8</sup>.

Like other Middle East country, Jordan also facing the problem of water pollution by arsenic and it became apparent after the lab tests were done from several water sources. There were emergences of arsenic poisoning cases from the food and water industry in Jordan. Apart from that, the penetrated boreholes for water usage particularly penetrated until to the arsenic defilement could increments the source of arsenic content through the regular process of draining from the bedrock<sup>9</sup>. As to tackle this problem, the arsenic content can be get rid by several techniques such as coagulation, precipitation, ion exchange, adsorption and reverse osmosis.

This study focused on the coagulation method for removal arsenic. The coagulation is one of the main unit operations in drinking water treatment process that has been successfully implemented in several water facilities. The target is to eliminate colloids and particles by coagulants such as alum and ferric chloride<sup>10</sup>. The coagulation for the water treatment also has been well studied in many areas, for example the reduction effects of turbidity, alkalinity, coagulant dosage, and mixing rate. Besides, issues dealing with the removal of natural inorganic matters in drinking water via coagulation have also been extensively discussed. It has long been the primary methods of treating metal-laden industrial wastewater as it can remove up to 20% of arsenic<sup>11</sup>.

Other countries facing the similar problem like Jordan are Bangladesh and India. Bangladesh is one of the countries with the highest arsenic concentrations greater than 0.06 ppb. While people from some village in West Bengal, India were poison by various aspects of arsenic groundwater contamination and arsenic contamination in 1978 after the highest concentration of arsenic close to 0.05 ppb<sup>6, 12-13</sup>. Hence, the main goal of this study is to determine the arsenic contamination level in Jordan, Zarqa, and Yarmouk River and to analyse the performance and effectiveness of coagulation method for arsenic removal.

## METHODOLOGY

**Sample Preparation:** The experiments were done at Yarmouk University after the samples collected from three different areas (upstream, middle stream and downstream) and from three different rivers which are

the Zarqa, Yarmouk and Jordan River. The samples were taken twice a week for each of the rivers. The collected samples analyzed in the university laboratory and recorded as shown in Table 1.

**Materials and Method:** Magnesium sulphate ( $MgSO_4$ ), aluminium sulphate ( $Al_2(SO_4)_3$ ), ferric chloride ( $FeCl_3$ ) and ferric sulphate ( $FeSO_4$ ) were used as coagulant in solvent to increase the colloid for solution in coagulation methods. Sodium hydroxide, aluminium hydroxide and potassium hydroxide used to control pH value<sup>14</sup>.

**Coagulation Method:** In general, a six-basin coagulation method device was used. The arsenic-containing water samples were added followed by the coagulant such as magnesium sulphate, aluminium or ferric chloride. The experiment was done in different conditions such as different coagulant weight, the pH was set at 5-11 and the speed was 10-15-30 rpm<sup>15</sup>. Figure 1 depicts the state of the samples before coagulation. This process was repeated for all samples collected from upstream, middle and downstream of the river. The results for the concentration of arsenic after coagulation are shown in Figure 2. The value of pH, speed of mix, weight of coagulate and type of coagulate are varied in order to carry out the experiment for the removal of arsenic. The absorption of concentration by GF-AAS before and after coagulation was recorded<sup>16</sup>.



**Figure 1: Sample before Coagulation**



**Figure 2: Samples after Coagulation**

**Table 1: Samples Collection from Jordan, Yarmouk and Zarqa River**

Rivers	River Water Sampling					
	1 <sup>st</sup> Sampling			2 <sup>nd</sup> Sampling		
	Upstream	Middle stream	Downstream	Upstream	Middle stream	Downstream
Z	3	3	3	3	3	3
J	3	3	3	3	3	3
Y	3	3	3	3	3	3
Total of samples	54					

**Note:** Z: Zarqa River; J: Jordan River; Y: Yarmouk River

**Graphite-Furnace Absorption Spectrophotometry (GF-AAS) Technique:** In GF-AAS technique, the tests are carried out in a small graphite tube, which would then be able to be warmed in order to vaporize and atomize the example arrangement. A small amount of the component of the example are lessened to free, and in ground state particles, which assimilate or spread light at specific wavelengths.

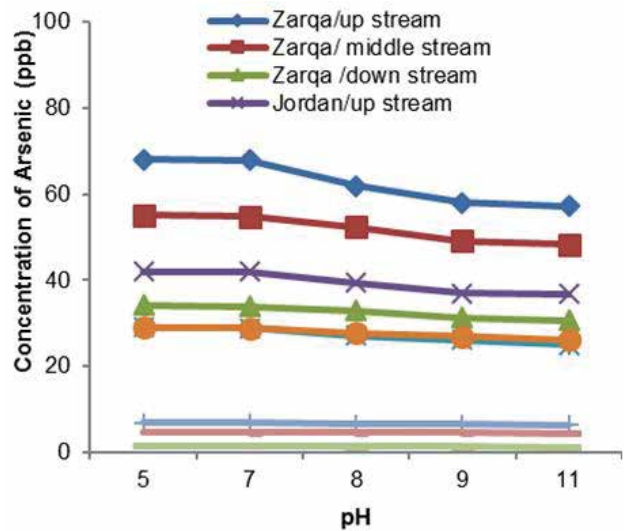
**RESULTS AND DISCUSSION**

**Effect of pH in Coagulation:** In this experiment, the minimum, maximum, standard deviation and mean values of arsenic concentration (ppb) in all water samples per location taken from three different Rivers are shown in Table 2, followed the order of Zarqa River > Jordan River > Yarmouk River. From three Rivers, the highest concentration of arsenic was found at pH 5. While, the lowest values for concentration of arsenic were found at pH 11.

Table 2 shows the results of the arsenic concentration using coagulation process with different pH level of Magnesium sulphate. The results show that the mean of arsenic concentration in the Jordan River using pH of 5 was 33.64 ppb, pH of 7 was 33.69 ppb, pH of 8 was 29.86 ppb, pH of 9 was 28.04 ppb and for pH of 11 was 27.35 ppb. Meanwhile, in the Yarmouk River, the concentration of arsenic at the pH of 5, 7, 8, 9 and 11 exhibit similar result which was 4.21 ppb. For Zarqa River, concentration of arsenic at pH 5 was 52.23 ppb, at pH 7 was 51.74 ppb, at pH 8 was 48.09 ppb, at pH 9 was 45.5 ppb and at pH 11 was 44.56 ppb. These results

comparative with Bangladesh in which the maximum concentration was equal to 60 ppb, while in India was found to be equal to 50 ppb<sup>17-18</sup>.

As the pH increased, the coagulate increases and the percentage of arsenic decreases at low speed. It is accomplished at various coagulant measurements of ferric chloride and magnesium sulphate as in water pH was change from pH 5 to pH 11. When coagulation with various FeCl<sub>3</sub> dosages, extending from 5–10 g FeCl<sub>3</sub>-MgSO<sub>4</sub> and 10 g FeCl<sub>3</sub> diminishing the pH of the water from pH 5 to 11 builds the broke down arsenic expulsion from 94% to 96%<sup>19</sup>. In examination with the crude water, pH remedy enhanced the evacuation of arsenic removal of about 20% - 28% from the rivers as shown in Figure 3.



**Figure 3: Relationship between Different pH and Concentration of Arsenic**

**Table 2: Concentration of Arsenic with Different pH for Zarqa, Yarmouk and Jordan River**

Rivers	pH 5	pH 7	pH 8	pH 9	pH 11
J-sample 1-US	42.03	41.90	37.40	35.50	34.24
J- sample 1-US	29.00	28.90	25.02	23.20	22.99
J- sample 1-US	28.98	28.87	25.70	24.02	23.99

Conted...

J- sample 2-US	43.01	43.88	37.03	36.01	34.98
J- sample 2-US	28.80	28.70	25.70	24.21	23.32
J- sample 2-US	30.00	29.90	28.30	25.31	24.58
Mean	33.64	33.69	29.86	28.04	27.35
Y- sample 1-US	6.79	6.79	6.79	6.79	6.79
Y- sample 1-US	4.73	4.73	4.73	4.73	4.73
Y- sample 1-US	1.42	1.42	1.42	1.42	1.42
Y- sample 2-US	6.69	6.69	6.69	6.69	6.69
Y- sample 2-US	4.10	4.10	4.10	4.10	4.10
Y- sample 2-US	1.53	1.53	1.53	1.53	1.53
Mean	4.21	4.21	4.21	4.21	4.21
Z- sample 1-US	68.03	67.9	61.92	58.001	57.211
Z- sample 1-US	55.01	54.8	52.3	49.1	48.329
Z-sample 1-US	34.1	33.92	32.9	31.2	30.542
Z- sample 2-US	67.03	66.7	60.3	56.003	54.551
Z- sample 2-US	52.9	52.01	47.1	45.103	43.99
Z-sample 2-US	36.3	35.1	34.03	33.603	32.712
Mean	52.23	51.74	48.09	45.5	44.56

**Note:** US: upstream; Z: Zarqa River; J: Jordan River; Y: Yarmouk River

**Relationship between Speed of Mixing and Coagulation:** Table 3 represents the results of the arsenic concentration with different speed of mixing. The experimental data shows that when the speed of mixing increased, the colloid decreases so that the concentration of arsenic increases. On the other hand, when speed of mixing decreased, the colloid increases so that the concentration of arsenic decreases.

The mean average of samples in Jordan River with the high speed mode of 30 rpm was 31.69 ppb. For the medium speed (15 rpm), it was 29.41 ppb and at the low speed of mixing (10 rpm), the mean average was 27.14 ppb. In Yarmouk River, the highest one has mean average of samples with the high speed mode of 30 rpm, which is 4.22 ppb. For the medium speed with 15 rpm, it was 3.88 ppb and with the low speed of mixing (10 rpm), the mean average was 3.61 ppb. For Zarqa River, mean average of samples with the high speed mode of 30 rpm was 50.24 ppb. For the medium speed with 15 rpm, it was 47.24 ppb and with the low speed of mixing that was 10 rpm, mean average was 44.28 ppb as elucidated in Table 3.

**Effect of Coagulate Type and Weight on Concentration of Arsenic:** When  $MgSO_4$ ,  $Al_2(SO_4)_3$  and  $FeCl_3$  were added to coagulation methods Mg separated as cation  $+2$  and  $SO_4$  as anion  $-2$ , so the arsenic contact with anion to a lot of atom bond between Cl and Fe, so take a long time than  $MgSO_4$  to broken as shown in Table 4.

**Table 3: Concentration of Arsenic at Different Speed for Zarqa, Yarmouk and Jordan Rivers**

Rivers	High Speed = 30rpm As (ppb)	Middle Speed = 15rpm As (ppb)	Low Speed = 10rpm As (ppb)
J- sample 1-US	39.1	36.7	34.02
J- sample 2- MS	27.21	25.02	22.91
J- sample 1-DS	28.3	26.13	23.99
J- sample 1-US	40	37.01	34.83
J- sample-2-US	27	24.92	23.11

Conted...

J- sample-2-DS	28.5	26.67	24
Mean	31.69	29.41	27.14
Y- sample 1-US	6.8	6.32	5.91
Y--sample 2- MS	4.72	4.41	4.1
Y- sample 1-DS	1.4	1.2	1.1
Y- sample 1-US	6.72	6.1	5.61
Y- sample-2-US	4.2	3.81	3.6
Y- sample-2-DS	1.5	1.41	1.31
Mean	4.22	3.88	3.61
Z- sample 1-US	65.88	62	57
Z-sample 2- MS	54.32	51.21	48.16
Z- sample 1-DS	34.01	32.19	30.02
Z- sample 1-US	61.01	57.92	54
Z- sample-2-US	50.21	46	44
Z-sample-2-DS	36	34.09	32.51
Mean	50.24	47.24	44.28

**Note:** US: upstream; MS: midlestream; DS: downstream; Z: Zarqa River; J: Jordan River, Y: Yarmouk River

**Table 4: Concentration of Arsenic for Zarqa, Yarmouk and Jordan Rivers at Different Coagulant**

Sample ID at Speed 15 rpm, pH 11, 10 g of Coagulant Type	MgSO <sub>4</sub> Concentration of As (ppb)	Al <sub>2</sub> SO <sub>4</sub> Concentration of As (ppb)	FeCl <sub>3</sub> Concentration of As (ppb)
Z-sample 1-DS	32.19	27.10	27.90
Z-sample 2-DS	34.09	37.60	37.90
J-sample 1-DS	25.02	28.07	28.30
J-sample 2-DS	24.92	27.30	27.80
Y-sample 1-DS	6.32	6.90	7.00
Y-sample 2-DS	6.10	6.80	6.70
Mean	21.44	22.30	22.60

**Note:** DS: downstream; Z: Zarqa River; J: Jordan River; Y: Yarmouk River

## CONCLUSION

In this study, Zarqa River had the highest of arsenic concentration and Yarmouk River showed the lowest one. All the concentration of arsenic in Zarqa, Yarmouk, Jordan River was equal or lower than the maximum permissible limits even though the levels of arsenic in these rivers were higher than in the rain water. The experiment showed that the pH, speed of mixing, type and weight of coagulant affect the coagulation test. The increasing of pH resulted in decreasing in the percentage of arsenic. The low speed of mixing influenced in decreasing of the arsenic concentration, meanwhile

by increasing the weight of coagulant will reduce the concentration of arsenic. The coagulation technique proved effectively in removing arsenic approximately about 20%. Arsenic contamination of water is a noteworthy issue confronted around the world. GF-AAS technique recorded proficiency in reading the smallest concentrations of arsenic in ppb units. For instance, screening for arsenic and other conceivable compound contaminants that can cause issues with wellbeing or agreeableness, including arsenic, is additionally vital to guarantee that new sources are adequate. Incidental screening may likewise be required after a source is built up to guarantee that it stays safe.

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# An Exploratory Study of Personality Traits and Psychological Coping Skills on Archery Performance

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## ABSTRACT

It is essential for coaches to understand the uniqueness of psychological elements and personality traits factors amongst athletes' in order to optimise transmission of messages for efficient performance. The present study intends to explore the personality traits and psychological coping skills with their association to archery performance. A total of 32 archers drawn from different archery programmes participated in the study. The revised version of Eysenck personality, as well as psychological coping skills inventory, were used to determine the extroversion, neuroticism traits and psychological coping skills of the archers prior to their archery shooting tests. Discriminants analysis discriminate three variables from the eight with an acceptable Canonical correlation of 0.70 and excellent accuracy of 77.42%, 80.65%, and 83.87% respectively. Moreover, a follow up test from independent t-test reveals no statistically significant difference between the personality traits and archers' ability of coping with adversity, coachability, concentration, confidence & achievement motivation, goal setting and mental preparation, peaking under pressure, freedom from worry, as well as their archery shooting scores  $p > 0.05$ . The findings from the present study indicated that both personality traits of extroversion and neuroticism possessed considerable psychological coping skills, therefore both could be suitable for performing sport of archery.

**Keywords:** Personality traits, Psychological coping skills, Archery performance.

## INTRODUCTION

Personality is understood to be related to the specific traits a person displays. A trait is a characteristic, which can be associated with a person, for instance 'confidence, fear and laziness'. Thus, the combination of these traits results in personality<sup>1</sup>. Similar to any construct in psychology there are many theories of personality. The most commonly used theories are; the Five Factor Model

of Personality (FFM), Eysenck Personality inventory (EPQR-Short)<sup>2-5</sup>. Different traits could interact, which highlighted that no individual trait is independent of another and it is the interaction of the said traits that result in the person's personality<sup>4,6</sup>.

Preceding researchers documented that personality types could play a role in sporting performance<sup>7</sup>. Evidence has also indicated that non-athletes usually tend to be more introverted while athletes seem to be more extroverted who also display lower levels of depression, fatigue, confusion and anger<sup>8</sup>. Although, it was reported that there is no direct relationship between personality types and being successful in sporting performance<sup>9</sup>. An investigation of the effect of psychoticism personality trait on shooting accuracy in rifle shooter presented some variations<sup>10-11</sup>. Other researchers examined the influence of personality and anxiety with a number of requests when learning to putt in golf<sup>12</sup>.

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A number of researchers have attempted to offer insights on the effects of psychological skills to the improvement of athletic performance in various sports. Investigation of the roles of psychological factors on the performance of elite soccer players was reported<sup>13</sup>. Likewise, psychological factors such as stress and worry could be a major factor in hindering athletes' performance<sup>14-15</sup>. It is further stressed that athletes who are unable to cope with stress and adversity might likely suffer from performance declining and general psychological well-being issues. Moreover, in the sport of archery, shooting in archery involves several crucial phases such as stance, holding the bow, raising and pulling back, aiming, releasing and observing<sup>16-18</sup>.

Some theoretical and experimental researchers concerning psychological factors in various sports have long been documented<sup>13-15</sup>. In the sport of archery, however, greater efforts have been concentrated on anxiety, mainly pre-competition anxiety; this is due to the apparent physiological variations related to anxiety and because of investigation proposing extreme performance and health effects connected with anxiety and stress<sup>19-21</sup>. Thus, the aim of the present study is to examine the psychological coping skills and its possible association with personality in the performance of archery.

**METHODOLOGY**

A total number of 32 archers were recruited to participate in this study. The participants were 24 males and 8 females youth archers between the ages range of 13-24 with a mean and standard deviation of (17.0 ± 3.4 years) drawn from Terengganu Malaysia.

EPQR-Short is a self-reported questionnaire was used in this study to determine the personality traits of the archers. It contained 48 items, 12 for each of the traits of neuroticism, extroversion, psychoticism and lie scale<sup>5</sup>. Each independent item was scored 1 or 0, and each scale has a maximum possible score of 12 and a minimum of zero<sup>22</sup>.

The Athletic Coping Skills Inventory (ACSI), a measure of an athlete's psychological skills was

adopted<sup>23</sup>. The ACSI has been reported to be valid and reliable for assessing the psychological coping skills of athletes<sup>24-25</sup>.

A simulated shooting competition area was set up, and all the archers' shoot six arrows (one end) over a distance of 50 meters. All the archers were given trials of four arrows shot before recording the final six arrows scores.

In the present study, Discriminant analysis (DA) was employed using the standard, forward stepwise, and backward stepwise methods to discriminate the performance of the identified personality traits<sup>29-39</sup>. Additionally, an independent t-test was used as a follow up to determine the differences of the personality traits on the measured variables. All the statistical analysis was performed at  $p \leq 0.05$  alpha level of confidence using XLSTAT 2014 (add-in software) and SPSS version 21 for Windows.

**RESULTS AND ANALYSIS**

Table 1 demonstrates the descriptive statistics of the parameters evaluated. It can be noticed from the table that there is a relatively higher mean score with no much difference between the two personalities in all the measured variables which reveal that both the extroverts and the neurotics have a substantial level of psychological coping skills and both possess higher archery shooting scores.

Table 2 presents canonical correlation of 0.70 demonstrating the discriminating the variables under study. There is no significant difference was observed between the personalities and measured variables  $p > 0.05$ .

Table 3 illustrates the discriminant analysis (DA) conducted for determining the accuracy of the DA in differentiating the two personalities on the measured variables.

Table 4 reveals no significant difference between the two personalities on their scores in the psychological coping skills and the archery shooting scores  $p > 0.05$ .

**Table 1: Descriptive Statistics of the Assessed Parameters**

Variables	Personality	N	M	SD	SE
Coping with Adversity	Extrovert	25	7.16	1.97	0.39
	Neurotic	7	6.43	1.13	0.43
Coachability	Extrovert	25	5.32	1.07	0.21
	Neurotic	7	4.57	1.90	0.72

Conted...

Concentration	Extrovert	25	6.12	1.54	0.31
	Neurotic	7	4.86	1.21	0.46
Confidence and Achievement Motivation	Extrovert	25	7.48	1.83	0.37
	Neurotic	7	7.14	1.07	0.40
Goal Setting and Mental Preparation	Extrovert	25	6.80	1.89	0.38
	Neurotic	7	7.57	1.90	0.72
Peaking under Pressure	Extrovert	25	5.64	1.25	0.25
	Neurotic	7	4.71	0.76	0.29
Freedom from Worry	Extrovert	25	5.72	1.70	0.34
	Neurotic	7	6.43	2.23	0.84
Archery Shooting Scores	Extrovert	25	45.24	10.58	2.12
	Neurotic	7	45.00	10.63	4.02

**Table 2: Inferential Statistics of the Discriminant Analysis**

Eigenvalue	% of Variance	Cumulative %	Canonical Correlation	Wilks' Lambda	Chi-Square	DF	Sig
0.883	100	100	0.70	0.531	12.59	6	0.588

**Table 3: Classification Matrix of the Discriminant Analysis of the Two Personality Types**

Assigned Classes	% Correct	Classification Matrix assigned by DA	
		Extrovert	Neurotic
<b>Standard mode (3 dependent variables)</b>			
Extrovert	87.50%	21	4
Neurotic	43.86%	3	3
Total	77.42%	24	7
<b>Backward stepwise (3 dependent variables)</b>			
Extrovert	88.00%	22	3
Neurotic	50.00%	3	3
Total	80.65%	25	6
<b>Forward stepwise (3 dependent variables)</b>			
Extrovert	88.00%	22	2
Neurotic	66.67%	3	4
Total	83.87%	25	6

**Table 4: Inferential Statistics of the Pairwise Comparison for the t-Test**

Variables	t	DF	M	SE	F	Sig
Coping with Adversity:	0.93	17.36	0.73	0.58	2.41	0.359
Coachability	1.37	7.09	0.75	0.55	8.19	0.182
Concentration	2.00	11.97	1.26	0.55	0.11	0.055
Confidence & achievement motivation	0.46	17.00	0.34	0.54	2.07	0.647
Goal Setting and mental Preparation	-0.95	9.60	-0.77	0.81	0.01	0.349
Peaking under pressure	1.85	16.38	0.93	0.38	2.07	0.075
Freedom from worry	-0.91	8.06	-0.71	0.78	0.14	0.368
Archery shooting scores	0.05	9.60	0.24	4.54	0.09	0.958



## DISCUSSION

It was shown in the present study that two types of personality traits of extroversion and neurotics were associated to the archers as identified.

Although, personality is hard to describe because of its complex nature; nevertheless, it explained that is the characterization of individual uniqueness<sup>2</sup>. It is important for a coach to realise the personality of athletes so as to enhance the transmission of messages to improve performance. In<sup>4</sup> opined that for instance, athletes contending at International level are likely to exhibit lower neuroticism and higher levels of extroversion. Evidence has also shown how the direction of causality may not be fully known as demonstrated from a study of British Gymnasts showing greater extroversion after excellent preparation in the lead up to competition. However, it<sup>9</sup> reported that there is no direct link between personality types and being successful in sporting performance.

The present findings revealed that the performance of both personality traits does not significantly differ in the measured variables as shown from the evidence in Table 2. These findings are congruent with the findings of the previous researchers who inferred that personality plays a significant role in goal setting and the kinds of goals individuals' set<sup>26-27</sup>. These Goal-setting are an essential aspect of the sport and a broad concept in itself. However, it is noted that goals are generally set to link to the individual's personality<sup>27</sup>.

A report have reflected on how different trait dominance results in several coping strategies being exhibited<sup>21</sup>. Archery is a close skill sport in which the competitors are expected to compete individually. During the competition, there may be several uproars, tensions, and apprehension and therefore, careful attention in shooting becomes significant.

## CONCLUSION

The role of personality in sports and exercise science has received little empirical attention. Although, evidence has shown that in another non-sporting dimension, there are some enormous differences in personality traits among group members revealing that extraversion-agreeableness relate to achievement in team performance<sup>28</sup>. The current study has so far offered

some interesting perspectives on personality-trait associations in the sport of archery. The study results have revealed that both personality traits of extroversion and neuroticism possessed considerable psychological coping skills and therefore, both could be desirable for performing sport of archery.

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# Awareness on e-Health among Undergraduate Students in Bangladesh

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## ABSTRACT

The concept of e-health was established to help the underprivileged citizens who live in the rural part of the country. Bangladesh is an over-populated country where more than 70% population live in rural areas, but unfortunately due to lack of knowledge and awareness among the citizen the telemedicine concept is becoming popular only for citizens of urban areas. This sort of unexpected outcome of e-health system has limited the efficiency of the whole concept. In our research, we have selected a group of students who are studying in undergraduate program of science field and analyzed their knowledge on telemedicine through questionnaire. Later on, we also suggested few possible outcomes based on our research findings. During the analysis, SPSS version 20 was used along with *Likert* Scale technique and Spearman's Co Relation were used to comment on the findings.

**Keywords:** *Electronic health, Healthcare system, E-health, Telemedicine, Rural areas*

## INTRODUCTION

In developing countries, people living in rural areas, struggle to gain modern healthcare services. The recent advancement of technologies has initiated a new wave of opportunities in the industry, progressing medical science exponentially. Information and Communication Technologies (ICT) promises further development of healthcare services. At present, healthcare providers are working towards enabling access to healthcare through emerging technologies of e-Health.

Thanks to innovations like telemedicine is new networks for medical associated cooperation, education, and consultation are being explored<sup>1</sup>. Patients and physicians can now interact face to face remotely. Many

countries such as Australia, Canada, England, Finland, United States and so on, have effectively implemented projects in order to incorporate telemedicine and other advanced technologies in a diverse range of medical areas. These types of projects focus on diagnosis, treatment, prevention, awareness, and research, attempting various strategic telemedicine programs in recent years<sup>2</sup>. Among all the developing countries, Bangladesh is one of the most densely populated nations, where most people are living in rural areas<sup>3</sup>. A huge discrepancy in health care distributions persists between rural and urban areas, with people suffering due to a lack of medical expertise and healthcare services. In this situation, telemedicine may be an easier and inexpensive way to bridge the gap, employing limited resources. However, no widespread study has been undertaken on the prospective of telemedicine in Bangladesh.

Among reported studies, one<sup>4</sup> conducted on the applicability of telemedicine in Bangladesh, highlighting the current scenario and future outlook, emphasized on the necessity of more financial support. The study showcased the evaluation of the first years' experience in Bangladesh with a low-cost telemedicine link in 2000<sup>5</sup>.

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Their findings showed that the telemedicine system was a successful model for further projects, but internet services were a major limitation. A study<sup>6</sup> directed effective telemedicine projects in Bangladesh, especially on healthcare delivery for diabetes in tertiary care. Power failure, high cost of internet bandwidth across the country, non-availability of doctors (especially female physicians), technical support, etc. were some of the main constraints of the planned telemedicine system. Despite the lack of inclusive studies on telemedicine in Bangladesh, several international studies have investigated the matter. Results of a study<sup>7</sup> identified that the attitude towards new technologies was generally negative in these areas, presenting challenges for establishing telemedicine. Another<sup>8</sup> conducted on the awareness and attitudes of Indian medical practitioners and patients towards telemedicine exhibited the need of educational programs in order to spread awareness and change pre-existing mindset of both. Recognition is of extreme importance in the implementation of telemedicine in Bangladesh. Rural areas are great targets given the large population and the distance from urban locations. But this, along with the expansion of population, has made it difficult to deliver services, especially specialized care, leading to inequalities in accessibility. As such, telemedicine can help to provide advanced healthcare services, make specialized services available, and diminish their overall cost. Promoting these benefits will spontaneously lead to a gradual adaptation of telemedicine the stakeholders of the healthcare industry.

The current study aims to determine the awareness and attitude of students studying in the American International University-Bangladesh (AIUB), regarding telemedicine and its advantages in order to facilitate its implementation in Bangladesh.

### METHODOLOGY

Data was gathered through face-to-face visits. The target population consisted of undergraduate students of AIUB, located in Dhaka, Bangladesh. The students population selected were from Faculty of Engineering (FE), majority of which were from the Electrical and Electronic Engineering Department, and the Faculty of Science and Information Technology (FSIT) with the majority from the Computer Science Department. 194 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> year undergraduate students participated as research sample as the students studying in AIUB are from different parts of the country, completing their

primary and secondary education from different divisions of the country. Low rate of education limits maximum exposure of knowledge to the students in the tertiary level of education, with a diverse mix of knowledge, religion, background, but more importantly, access to information and healthcare. An investigative questionnaire was used as the data gathering tool, developed after consulting relevant work of past researches<sup>9</sup>. The questionnaire was validated by a board of specialists, consisting of statistical analysts and e-health experts. Divided in two sections, the first contained 16 questions (Table 1) examining awareness based on the *Likert* scale, varying from 5 possible options of “extremely important” to “not important”, with 1 open ended question. The second section evaluates the attitude of individuals towards telemedicine through 12 questions (Table 2). In order to evaluate the 186 valid responses (some of the responses were excluded due to invalid entries), both descriptive (average, frequency, standard deviation) and analytical (Spearman correlation test) tools were employed, with the help of the SPSS version 20 software.

Of the 186 students, 5 (2.7%) were studying B. Sc. in CoE, 31 (16.7%) were studying B.Sc. in CSE, and the rest 150 (80.6%) were B.Sc. in EEE.

**Table 1: Criteria Measuring Awareness and the Corresponding Labels**

Label	Criteria
A1	Awareness about the telemedicine services
A2	Telemedicine care versus in-person care
A3	Availability of telemedicine services in nearby hospitals
A4	Regional authority’s strategy
A5	Subjects’ previous experience with telemedicine
A6	Improvement of healthcare quality.
A7	Privacy concern
A8	Advantages of telemedicine services.
A9	Concern regarding usefulness of data storage
A10	Right to see the health record
A11	Subjects’ stand regarding benefits
A12	Concern regarding awareness of mass people.
A13	Concern regarding cost effectiveness.
A14	Concern regarding governmental priority.
A15	Challenges in implementing telemedicine.
A16	View regarding telemedicine service as a viable solution for healthcare improves.

**Table 2: Criteria Measuring Attitude and the Corresponding Labels**

Label	Criteria
B2	Concern regarding privacy of subject.
B3	Concern regarding staff behavior.
B4	Concern regarding enough advance notice for their visit.
B5	Concern regarding instructions.
B6	Concern regarding information clarity.
B7	Concern regarding clear visual of consultant
B8	Concern regarding clear audio reception of consultant
B9	Concern regarding ample consultation opportunity.
B10	Concern regarding follow up process
B11	Concern regarding reuse of telemedicine
B12	Concern regarding future recommendation.

In order to determine the level of exposure to ICT and Telemedicine, the students' year of study was considered as the base point, as the students are more likely to be subjected to ICT and Telemedicine as they gather more heterogeneous information with the progression of each academic year. Among the respondents, 23 (12.4%) were in their 1<sup>st</sup> year, 117 (62.9%) in the 2<sup>nd</sup>, 30 (16.1%) from the 3<sup>rd</sup>, and 16 (8.6%) from the 4<sup>th</sup> year. As a result, their access and awareness to ICT and its relevant implications are still at the initial stage.

In order to analyze the correlation between the attitude and awareness of students, their Cumulative Grade Point Average (C.G.P.A), S.S.C, and H.S.C results were used to gauge their level of intellect. It has been assumed that students with higher academic scores are more likely to have prior knowledge of ICT and Telemedicine. Table 3 shows the descriptive statistics of their academic results, in terms of minimum, maximum, mean/average, and standard deviation.

**Table 3: Descriptive Statistics of C.G.P.A, H.S.C Results and S.S.C Results**

	Minimum	Maximum	Mean	Standard Deviation
SSC	3.30	5.00	4.7969	.34915
HSC	3.30	5.00	4.6263	.41554
C.G.P.A	2.42	4.00	3.2649	.38852

In order to calculate W.A.S, the following formula was used:

$$W.A.S = \frac{\sum (\text{No. of Response for a particular Likert} \times \text{Weight of the Likert})}{\text{Total number of Responses}}$$

For interpreting the awareness and attitude scores in terms of W.A.S, the following methodology was used as presented in Table 4.

**Table 4: Quantifying the Level of Awareness and Attitude**

Scale	Level of Awareness and Attitude
1-2.5	Poor
2.5-3.5	Mediocre
3.5-4	Positive response
4-5	Strong Positive response

The second section provides a spearman correlation test on the attributes of attitude and awareness with respect to the students' year of study, C.G.P.A, H.S.C, and S.S.C results.

## RESULTS AND ANALYSIS

**Survey Outcome:** A total of 186 respondents responded to the awareness section. From that, it was seen that out of the 16 criteria in the assessment, A10 and A15 had W.A.S above 4 on a scale of 5 (4.04 & 4.03 respectively), suggesting highly positive awareness for those criteria. A9 and A14 had W.A.S. marginal 4 out of 5, signifying marginally positive awareness on those criteria. A6 and A16 had W.A.S above 3.5 (3.82 and 3.62 respectively), representing positive awareness about the criteria. While A7, A11, A2, A1, A8, and A13, had W.A.S between 2.97 to 3.5 (2.97, 3.01, 3.03, 3.04, 3.11, and 3.35 respectively), denoting the mediocre awareness regarding those issues. A5, A3, A12, and A4 had W.A.S below 2.5 (2.19, 2.19, 2.36 and 2.42 respectively) meaning they had poor awareness on those issues.

A total of 103 out of the 186 respondents had experienced telemedicine services, responding to the attitude section. According to the responses, it is seen that out of the 11 criteria in the attitude assessment, criteria B12 had W.A.S of 3.75 out of 4, representing a positive attitude towards the issue. All other criteria received W.A.S scores between 2.69 to 3.33, exhibiting mediocre attitude towards telemedicine.

**Spearman’s Co Relation Test:** A spearman correlation test has been carried out to find the correlation of Years of Study, S.S.C, H.S.C results and C.G.P.A with regards to the criteria under assessment for awareness test. No significant results were obtained for remarkable interpretation.

The same was undertaken to analyze the correlation between the years of study, academic results, and the criteria under the attitude assessment. Again, no significant results were obtained for notable interpretation.

In order to establish a relationship between the awareness of participants and their attitude towards telemedicine, the same was done for the 103 participants who responded to both the awareness and attitude test.

Most of the awareness criteria are seen to have a weak positive correlation with the criteria of the attitude assessment. However, awareness test criteria A2, A8, A9, A10 and A12 do not have any significant correlation with the any of the attitude test criteria.

The output results from the Spearman’s correlation test have been shown in the Table 5.

**Table 5: Analysis of the Correlation between Awareness and Attitude Criteria**

Awareness Criteria	Attitude Criteria	Coefficient	P-Value	Correlation Inference
A1	B4	0.268	0.006	Weak Positive
	B5	0.194	0.050	
	B8	0.300	0.002	
	B11	0.216	0.216	
A3	B3	0.229	0.020	Weak Positive
	B7	0.222	0.025	
	B8	0.262	0.008	
	B11	0.215	0.029	
A4	B3	0.245	0.013	Weak Positive
A5	B5	0.241	0.014	Weak Positive
	B8	0.293	0.003	
	B9	0.264	0.007	
	B10	0.227	0.021	
A6	B2	0.241	0.014	Weak Positive
	B3	0.268	0.006	
	B10	0.228	0.020	
	B11	0.197	0.046	Very Weak Positive
A7	B9	0.236	0.016	Weak Positive
A11	B3	0.234	0.018	Weak Positive
	B9	0.222	0.024	
A13	B9	0.231	0.019	Weak Positive
A14	B3	0.245	0.013	Weak Positive
	B11	0.231	0.019	
	B9	0.196	0.047	Very Weak Positive
A15	B6	0.301	0.002	Weak Positive
	B10	0.269	0.006	
	B12	0.269	0.002	
A16	B5	0.252	0.01	Weak Positive
	B11	0.225	0.022	
	B12	0.203	0.040	

Based on the W.A.S scores, the proposition for overcoming the criterion A3 (Lack of availability of service in nearby hospitals), A4 (raising awareness among the masses) and A5 (Little experience of using telemedicine services) has been detected below in Table 6.

**Table 6: Strategic Plan to Overcome Poor Awareness Regarding Telemedicine**

Criteria	W.A.S	Strategic Plan
A5 (Little experience of using telemedicine services)	2.19	Workshops from institutions/government implemented demonstrating the benefits of telemedicine services.
A3 (Lack of availability of service in nearby hospitals)	2.19	Government and private hospitals motivated to provide free telemedicine care in remote areas to promote the treatment scheme
A4 (raising awareness among the masses)	2.36	Workshops in regional schools by NGO/Governmental organizations, with live demonstration to raise awareness among the educated, which can then encourage their friends and family as well.
A4 (regional authorities lacks initiatives)	2.42	More initiatives through regional authorities in dissemination of information and raising awareness of telemedicine services.

## DISCUSSION

In order to evaluate the gap between the awareness of subject (W.A.S below 2.5) with the implementation of telemedicine services, and develop an approach to bridge it, the awareness criteria that are critical to consider have been presented with respective proposed strategic plans that can be implemented in Table 4.

From spearman's correlation test, it was found that with progressing academic years, the students' awareness and experience with telemedicine services did in-fact increase, with a mild positive correlation. The study also revealed that as the students moved towards their senior years, they believed that it implementing it will be less challenging.

The study also suggests that students with higher academic results tend to think that privacy concerns regarding healthcare records is not a major issue, though the correlation was found to be weak. They believe that governmental initiatives for encouraging private sectors to provide telemedicine services are important, although that too had a weak correlation.

But some senior academically-sound students expressed negative responses towards the behavior of telemedicine staff, with them experience a lack of opportunity for questioning the staff during treatment. But the correlation was found to be weak.

It was also observed that students with better results were concerned about the doctor-patient confidentiality, although with a weak correlation.

The correlation test between awareness and attitude revealed a number of significant findings.

Students who are more aware about telemedicine services had positive concerns regarding advanced notices, clear instructions for availing the service, proper audio reception during treatment, etc. They had positive response towards using telemedicine services again. Those who had experienced telemedicine services in their nearby hospitals, found the behavior of staffs and their role to be positive, with clear audio-visual reception during their sessions, stating they would use the service again. They stated that they were informed about the location, had clear audio reception, and were allowed to clarify their queries with the consultant, with information about the follow-up process. Those aware about the overall improvement of healthcare in Bangladesh are positive about the patient-doctor confidentiality, behavior of staff, follow-up process, and reuse of telemedicine. Students are aware about the privacy issues, responded positively regarding the technology being using. They also responded positively to the benefits of telemedicine.

## CONCLUSION

In this study, to determine the effectiveness of the telemedicine projects, the awareness and attitude amongst university students were investigated. The awareness and knowledge are two of the most important parameters to improve the quality of telemedicine. It encourages people to adapt to the new technology.



However, the results showed that the awareness regarding healthcare was still in the primary stage, with more than half of the participants having very poor awareness rates. This clearly reflects that even in the modern city, amongst educated people, the concept is not very popular yet, but the findings highlight it as a promising prospect. Rural people need to be properly advised and trained so they can avail its benefits. Based on the discussions and possible solutions/strategic plans, along with the spearman correlation test results, it can be concluded that in order to capitalize the ongoing and upcoming e-health projects, people need to be well-trained, with wide-spread awareness being created, so as to change the attitude towards telemedicine.

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# Indicator of Dyslipidemia for Ischemic Stroke in Elderly with Hypertension

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## ABSTRACT

Elderly with hypertension have a greater risk for ischemic stroke. It can be caused by dyslipidemia which is an abnormal amount of lipids in the blood such as increased levels of total cholesterol, LDL cholesterol, triglycerides and decreased levels of HDL cholesterol. The aim of this study is to analyze the indicator of dyslipidemia for ischemic stroke in elderly with hypertension. This study is an observational studies of analytical epidemiology with case control study design. The subject of study is the occurrence of ischemic stroke in elderly with hypertension who were admitted to outpatient installation RSU Haji Surabaya. The sample size for case and control samples were 74 patients. Samples were taken using simple random sampling methods. The data of total cholesterol, LDL cholesterol, HDL cholesterol, and triglycerides from patient medical records were analyzed using bivariate analysis ( $p=0.25$ ) is selected as a candidate for the multivariate analysis with multiple logistic regression ( $p=0.05$ ). Total cholesterol, LDL cholesterol and triglycerides are selected as a candidate ( $p=0.00$ ,  $p=0.18$ ,  $p=0.18$ ). The results showed that the most influential independent variables and became a model to predict the incidence of ischemic stroke in RSU Haji Surabaya was elevated total cholesterol ( $p=0.03$ ; OR=4.87; 95% CI=1.10-21,53). It was concluded that total cholesterol had an effect on the incidence of ischemic stroke in RSU Haji Surabaya. Self-awareness is required to perform blood cholesterol screening as a prevention efforts, especially for elderly with hypertension because of greater risk for ischemic stroke.

**Keywords:** *ischemic stroke, dyslipidemia, elderly, hypertension, cholesterol*

## INTRODUCTION

Non-Communicable Diseases (NCDs) are the cause of death around the world. The cases keep increasing and kill 38 million lives annually. As many as 85% of cases occurred in developing countries, including Indonesia. NCDs in Indonesia are estimated to reach 71% of total deaths <sup>[1]</sup>.

Stroke is a non-communicable disease that notoriously becomes worldwide problem since it is worlds number three cause of death, after heart disease

and cancer. In developing countries, it accounts for 85% of deaths and 87% lifelong disabilities <sup>[2]</sup>.

Indonesia is a developing country in Asia which ranks first as the country with the highest number of stroke patients. It is predicted that 500,000 Indonesians suffer from stroke every year, with about 25% of people dying and 75% having minor or severe disabilities <sup>[3]</sup>.

Based on the report of the results of basic health research in Indonesia, the increase in stroke prevalence diagnosed by health workers in 2007 reached 8.3/1000 population and in 2013 reached 12.1/1000 population. One province with a higher prevalence of stroke than the national average is the province of East Java, which is 16/1000 population. Higher than in 2007 of 7.7/1000 population <sup>[4]</sup>.

Stroke is generally classified into ischemic stroke with 80-85% of cases and hemorrhagic stroke with 15-20% of cases <sup>[5]</sup>. In Indonesia, ischemic stroke is the most

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common type of stroke that is 52.9% of cases [6]. Age is one of the most influential risk factors for ischemic stroke. Because along with increasing age, the greater the risk of a person suffering from ischemic stroke. This is due to degeneration of organ function in the body that is the decrease of blood flow to the brain resulting in the occurrence of stroke [7]. Based on Law Number 13 Year 1998 about the welfare of the elderly, it is explained that the elderly is someone who reached the age of 60 years and over [8].

The results of basic health research in 2013 it is known that the top 10 diseases in the elderly are dominated by the class of cardiovascular disease and the highest is hypertension, because the elderly will naturally experience a decrease in the degree of health. Uncontrolled hypertension or a history of hypertension in the elderly can lead to stroke. The prevalence of stroke in the diagnosed age group increased or experienced the highest symptoms at age  $\geq 75$  years and increased along with the age of a person [4].

*World Population Prospects* stated that the world's elderly population is increasing by 7.2% in 2013 and is predicted to increase to 9.6% by 2050. In Indonesia, there is also a potential fairly rapid increase of percentage in the elderly compared to other ages since 2013 as much as 8.9% until 2050 as much as 21.4%, and in contrast at age of 0-14 and 15-59 the percentage tends to decrease [9].

Stroke can be caused by dyslipidemia which is an abnormal state that is present in the blood. Dyslipidemia is indicated by increased levels of total cholesterol, *Low Density Lipoprotein* (LDL), triglycerides, and decreased levels of *High Density Lipoprotein* (HDL) [10].

Total cholesterol is an overall amount of HDL cholesterol level, LDL cholesterol and 20% triglycerides [11]. Total cholesterol level is associated with stroke because it is the risk factor for ischemic stroke [12]. An increase of 1 mmol/L can increase the risk as much as 25% [13]. That increase results in atherosclerosis which plays part in the occurrence of ischemic stroke [7, 11].

Dyslipidemia is a major risk factor for the atherothrombotic vascular disease, including ischemic stroke. Drug therapy is needed in the treatment of dyslipidemia, as well as slowing the progression of atherosclerosis, stabilizing rupture-prone plaque, reducing the risk of arterial thrombosis, and improving prognosis. But first, a diagnosis and an evaluation of

blood cholesterol levels is needed, consisting of total cholesterol, LDL cholesterol, HDL cholesterol, and triglycerides [5]. The aim of this study is to analyze indicator of dyslipidemia for ischemic stroke in elderly with hypertension, especially in RSU Haji Surabaya.

## METHOD

This research is an observational study of analytical epidemiology. Case control study design was conducted from November 2016 until January 2017 in Outpatient Installation RSU Haji Surabaya. The case population is the whole occurrence of ischemic stroke in elderly with hypertension. The control population is the whole occurrence other than ischemic stroke in elderly with hypertension. Samples are determined by the inclusion criteria of patients who perform complete blood cholesterol tests. To minimize the bias, exclusion criteria were set which are patients diagnosed with Hemorrhagic Stroke, Diabetes Mellitus and Coronary Heart Disease (CHD). The ratio of sample size for case and control is 1:1 so the total samples were 74 patients. Samples were taken using simple random sampling methods, lottery all the registration numbers of patients undergoing treatment by 2015. The data of total cholesterol, HDL cholesterol, LDL cholesterol, and triglycerides from patient medical records were collected using case data form and control data form.

The data were processed and analyzed with univariate, bivariate and multivariable analysis. Univariate analysis was conducted to examine the distribution of respondents data on the research. The results are presented in narrative and table format. To find the independent variable that qualified to become the candidate of multivariable analysis, selection with bivariate analysis ( $p < 0,25$ ) was conducted. The influential variables to see the effect of independent variable to the dependent variable was determined by multivariable analysis with Multiple Logistic Regression Test ( $p < 0,05$ ).

## RESULTS AND DISCUSSIONS

Table 1 showed the distribution of gender that the more than half (54.1%) were male respondents. Analysis of the gender of the respondents in this study showed that the majority of ischemic stroke respondents were male, which is similar to what has been reported in previous studies that more than 50% of patients with

ischemic stroke are male [14, 15]. This is because women are protected by the hormone estrogen so as to avoid heart disease and stroke. However, after entering the age of the elderly and experiencing the menopause, women's risks become equal to male. Many menopausal women in Canada die from stroke and heart disease each year compared to cancer [16]. Men with hypertension were 23.07 times more likely to have a stroke than women [17]. Gender is one of the risk factors that cannot be controlled and potentially effect on the incidence of stroke [18].

**Table 1: Distribution of gender**

Gender	Ischemic stroke	Without ischemic stroke	N (%)
	n (%)	n (%)	
Male	20 (54,1)	20 (54,1)	40 (54,1)
Female	17 (45,9)	17 (45,9)	34 (45,9)

Table 2 showed the total cholesterol, LDL cholesterol and triglycerides are selected as a candidate ( $p=0.00$ ,  $p=0.18$ ,  $p=0.18$ ) for the multivariable analysis. There are 3 variables that become candidates as indicator of dyslipidemia for ischemic stroke in elderly with hypertension in RSU Haji Surabaya.

**Table 2: Candidates of multivariable analysis**

Variabels	p-value	Results
Total cholesterol $\geq 200$ mg/dl	0,00	candidate
LDL cholesterol $\geq 130$ mg/dl	0,18	candidate
HDL cholesterol $< 30$ mg/dl	0,63	not a candidate
Triglycerides $\geq 150$ mg/dl	0,18	candidate

The results presented in bivariate analysis of total cholesterol for ischemic stroke in elderly in RSU Haji Surabaya is eligible to be included in multivariable analysis. The results is similar with a study by Hakim (2013) which showed a significant association ( $p=0.03$ ) between total cholesterol levels and the incidence of stroke. High total cholesterol can lead to plaque buildup in the arteries that supply blood to the brain causing stroke [20].

Total cholesterol can also affect the clinical outcomes of patients with ischemic stroke [21]. High total cholesterol levels can worsen the clinical outcomes of stroke due to the oxidation of cholesterol that can

initiate inflammatory processes and lead to plaque buildup in blood vessel walls that can inhibit blood flow in the arteries [22]. In contrast, in some cases high total cholesterol levels can also produce better clinical outcomes as they are affected by the protective effects of statin use in the acute phase of stroke [23]. These results are supported by Muhammad *et al.* (2014) who stated that patients with high total cholesterol levels have good clinical outcomes because cholesterol can serve as a buffer to neutralize free radicals and prevent the destruction of nerve cell tissue.

A study by Hakim (2013) in Dr. Kariadi Semarang and a study by Wu (2013) in China found significant results that showed a relationship between LDL cholesterol levels and the incidence of ischemic stroke. LDL cholesterol has a tendency to stick to blood vessel walls to form plaque that can narrow the blood vessels. Blockage mainly occurs in small blood vessels that supply nutrition to the heart and brain. Plaque on the vessels can detach and clog blood flow to the brain. Uneven blood vessels can also cause the formation of blood clots in the vessels. It can block the flow to the brain and cause stroke [26]. A decrease in LDL cholesterol by 1 mmol would decrease the fatal stroke by 17% [27].

A Study by Soebroto (2010) in RS Dr. Moewardi Surakarta, Muliawati (2015) in RSUP Dr. Kariadi Semarang and Sumiyah (2016) in RSD dr. Soebandi Jember showed that there is no specific relationship between LDL cholesterol levels and the incidence of ischemic stroke. The difference is caused by the difference of sample used in previous research that is on ischemic stroke and hemorrhagic stroke, history of ischemic stroke patients with diabetes mellitus complication and most of respondents who are ischemic stroke patients with productive age of  $\leq 55$  years.

The results presented in bivariate analysis of HDL cholesterol for ischemic stroke in elderly in RSU Haji Surabaya is not eligible for entry in multivariable analysis. This is because HDL cholesterol can also be pro-inflammatory and pro-atherogenic in stroke patients, which causes patients with normal HDL levels to have a poor clinical outcome [22]. HDL cholesterol levels can be increased by reducing weight, increasing physical exercise, and quitting smoking [31]. HDL cholesterol can be a risk factor for ischemic stroke [32]. One way that can be done to prevent for ischemic stroke is to increase HDL

cholesterol levels. HDL cholesterol acts as a “vacuum cleaner” that sucks in excess of cholesterol as much as possible. HDL cholesterol takes excess cholesterol from the cells and tissues and bring it back to the liver [33].

The difference results showed a significant relationship between HDL cholesterol level and the incidence of stroke [19]. The study by Yeh *et al.* (2013) in Taiwan and Sohail *et al.* (2013) in Pakistan stated that patients with low HDL ( $\leq 35$  mg/dl) had greater stroke severity and poor clinical outcomes. Low HDL cholesterol levels can increase the risk of blood clots in the carotid arteries, causing a risk of stroke. Low HDL cholesterol levels have the same danger of having too high cholesterol levels of LDL [36].

The 33-years study with 7579 female patients and 6372 male patients showed that elevated triglyceride levels contribute in increasing the risk of ischemic stroke in men and women [37]. The high triglycerides and low HDL cholesterol were associated with an increased incidence of ischemic stroke in both genders [38]. A cohort study by Nodestgaard *et al.* (2007) it was seen that there was an increased risk of stroke associated with blood fat levels called triglycerides. The high triglycerides can increase risk factors for ischemic stroke three to four times greater [40]. Increased triglyceride levels also make LDL cholesterol toxic to artery walls and reduce the beneficial effects of HDL cholesterol [41].

Triglycerides formed as a result of the metabolism of foods in the form of fat and also in the form of excessive carbohydrates and protein are not entirely needed as an energy source [42]. A study by Wardaini (2012) stated that triglycerides are not associated with ischemic stroke. Patients with obese often have high triglyceride levels and these conditions can lead to elevated risk of heart disease or stroke [44].

Table 3 showed that the most influential independent variables and became a model to predict the incidence of ischemic stroke in elderly with hypertension in RSU Haji Surabaya is total cholesterol. This is evidenced by the results of statistical analysis are significant with  $p=0.03$  ( $p<0.05$ ). Total cholesterol with OR=4.87 which means that the possibility of elderly with hypertension with total cholesterol level  $\geq 200$  mg/dl will suffer an ischemic stroke 4.87 times greater when compared with elderly with hypertension with total cholesterol of  $<200$  mg/dl.

**Table 3: Indicator of dyslipidemia for ischemic stroke in elderly with hypertension**

Variabel	B	OR	95% CI	p-value
Total cholesterol $\geq 200$ mg/dl	1,58	4,87	1,10-21,53	0,03
LDL cholesterol $\geq 130$ mg/dl	0,16	0,85	0,19-3,74	0,83
Triglycerides $\geq 150$ mg/dl	1,08	2,96	0,78-11,21	0,11
Constant	-1,64			0,01

Multivariable analysis showed that total cholesterol level becomes the most influential cholesterol test, thereby it is used as an indicator for ischemic stroke, especially in elderly with hypertension. Many studies have shown that high total cholesterol levels are often associated with the risk of stroke [45]. Increased total cholesterol levels in the blood will lead to the formation of plaque in the blood vessels causing a stroke [7].

The patients with ischemic stroke with a total cholesterol level of  $\geq 200$  mg/dl had a 3.584 times greater risk of having poorer clinical outcomes compared to patients with normal total cholesterol levels [46]. A study by Karunawan *et al.* (2016) in RS Bethesda Yogyakarta obtained significant results ( $p=0,00$ ) on the correlation of total cholesterol level with functional outcome of ischemic stroke patients. In addition, high total cholesterol levels can also worsen the clinical outcomes of stroke. The cause is the oxidation of cholesterol can initiate the inflammatory process and the formation of plaque on blood vessel walls that can inhibit blood flow in the arteries [22]. A study by Khalil *et al.* (2013) in Egypt, it is known that the Relative Risk of total cholesterol in ischemic stroke patients with hypertension is 3.35 which means the possibility of patients with high total cholesterol levels accompanied by hypertension to have ischemic stroke is 3.35 times greater when compared to hypertensive patients with low total cholesterol levels. The results were obtained from 63.81% of ischemic stroke patients aged  $\leq 65$  years. Total cholesterol levels and the disability outcomes also showed a significant association of acute ischemic stroke patients [49].

Based on modified levels of stroke risk factors it was found that high total cholesterol levels increased the relative risk of death by 3.9 times. As a correlation between the severity rating system of each dyslipidemia and other modifiable risk factors and patterns it was found

that APACHE II scores correlated positively with high total cholesterol levels and strongly correlated positively with age. At the same time, according to Glasgow Coma Scale (GCS) mortality is positively correlated with high total cholesterol [48].

The difference results showed a high total cholesterol was associated with reduced stroke severity and resulted in better clinical outcomes because it was influenced by the protective effects of statin use in the acute phase of stroke [23]. High total cholesterol levels have good clinical outcomes because cholesterol can serve as a buffer to neutralize free radicals and prevent damage to nerve cell tissues [24].

## CONCLUSIONS

It can be concluded that the indicator of dyslipidemia for ischemic stroke in elderly with hypertension in RSU Haji Surabaya is total cholesterol level with  $OR=4.87$ . The hospitals can perform routine total cholesterol tests for patients diagnosed with ischemic stroke, so as to control the occurrence of recurrent strokes and other comorbid complications that can worsen the condition of the patient. The public should have self-awareness is required to perform blood cholesterol screening as a prevention efforts, especially for elderly with hypertension because of greater risk for ischemic stroke.

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# Supporting Factors to Get Coverage of Malaria Mass Blood Survey (MBS) Above 80% : Lesson Learn From Gripit Village, Banjarmangu Sub District, Banjarnegara District

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## ABSTRACT

Malaria in Gripit Village, Banjarmangu Sub district was increased at the end of 2017, by discovery of 14 patients with malaria indigenous. Mass Blood Survey (MBS) activity was carried out in this village because malaria transmission still occurred even though Mass Fever Survey has been held and malaria patient without specific symptoms were found. The purpose of this paper is to analyze factors that support the coverage of malaria MBS above 80%. The method was observation by using observation guideline before and during MBS implementation. MBS was done in 2 days in January 2018. The result showed that the MBS coverage in Desa Gripit was 86.38%, the supporting factors were socialization before the activity, MBS was held together with the distribution of the mosquito net (something was obtained), MBS was done whole day (morning, noon, evening), monitoring coverage in MBS process, and active role from health cadres to persuade the villagers. MBS coverage more than 80% supported by multifactor.

**Keywords:** : Mass Blood Survey, malaria, banjarnegara, socialization, health cadres

## INTRODUCTION

Malaria in Indonesia tend to decreases with Annual Paracyte Incidence (API) 2.8/1,000 inhabitants at 2007 and API of malaria in 2016 0.77/1,000 inhabitants.<sup>1,2</sup> Linier with API malaria in Indonesia, API malaria in Central Java at 2007 0.05/1,000 inhabitants while at 2017 0.01/1,000 inhabitants.<sup>3</sup> Banjarnegara is one of district in Central Java with malaria problem. Data from Banjarnegara Health District shows Annual Paracyte Incidence malaria in Banjarnegara at 2007 as much 0.09/1000 inhabitants and 2017 0.09/1,000 inhabitants. Malaria in Banjarnegara focused in some of Sub district. One of Subdistrict in Banjarnegara with malaria problem is Banjarmangu. Mass Blood Survey is one of method to find malaria cases to cut chain of malaria transmission.

Mass Blood Survey done in endemic area of malaria, endemic area with malaria cases without specific symptom, area with increases malaria, area with low access to health provider.<sup>4</sup>

Banjarmangu Subdistrict have 2 Public Health Center ie : Banjarmangu 1 and Banjarmangu 2 Public Health Center. Banjarmangu 1 public health center had 9 villages, ie : Rejasari, Paseh, Sigeblog, Pekandangan, Banjarmangu, Jenggawur, Banjarkulon, Gripit Village. Malaria in Banjarmangu I Public Health Center at 2016-2017 found in almost every month. Malaria cases in Banjarmangu I Public Health Center at 2016 and 2017 always found in every month. Malaria at the end of 2017 in Banjarmangu dominated in Gripit Village. Mass Blood Survey had been done in Gripit Village because there were malaria increase and the tendency malaria in this area without specific symptom.

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## METHOD

The method used is observation by using observation guideline done before and during MBS implementation. MBS was done 2 days in January 2018 in Gripit Village Banjarmangu Sub district Banjarnegara District.

## RESULTS AND DISCUSSIONS

Malaria incidence was interaction from host, agent (plasmodium) and environment. The existence of plasmodium in host could be source of malaria transmission specially plasmodium in gamet phase. The malaria vector (Anopheles) having role to transmit plasmodium from human to human.<sup>5</sup> Mass Blood Survey is one of method to find human with plasmodium in their blood stream. The success of Mass Blood Survey (MBS) based on two main aspect, the readiness of health worker and community participation. Health worker with good microscopist and active cadre that have ability to build community participation. Community with high participation supporting for the success of MBS. Commonly to get MBS coverage over 80% was rare. Research in Purworejo District show that MBS coverage 26%.<sup>6</sup> Combination of PCR and microscopic malaria examination was done in North West Thailand this research conclude that a combination of pooling, real time PCR and expert microscopy provide a feasible approach to identifying and threating asymptomatic malaria infection in timely manner.<sup>7</sup> The weakness of analysis of this paper not including time required to send sample before check by PCR. Polymerase Chain Reaction to detect malaria is needed because in low endemic area of malaria there is

possibility to find malaria cases asymptomatic and negative in microscopic test but carry plasmodium in their body. In pre elimination and elimination area where malaria paracyte density is low It could be source of malaria transmission.

Active Case Detection was done in Gripit Village by collaboration of officer from Banjarmangu 1 Public Health Center, Banjarnegara Health District, Research and Control Animal Disease Control Unit. The beginning of MBS was socialization to health cadre, public figure and village government leaders. Strategy of MBS implementation, teamwork and MBS pos, target estimated coordinated at the time of socialization. Officers Mass Blood Survey divided into three team, each team stay in one sub village. There were 3 Sub Village in Gripit : Gripit, Grumung and Sikasur. Purpose of MBS were to found malaria sufferers in high endemicity areas that have not demonstrated any specific clinical symptoms in the community, decrease the source of transmission by treatment of all malaria-positive patients and find and meat the time of socialization treat malaria sufferers in the area of increasing cases. Pos of Mass Blood Survey in Gripit Village can be see in Pic 1



**Picture 1: Pos of Mass Blood Survey**

Observation on the step of malaria Mass Blood Survey (MBS). We conclude there were five important step in this MBS process. Five step in MBS could be applied in another area Step number one is determine population target and area in the MBS of malaria.

Population target useful in calculating material planning and number of teams, estimate number of days and as denominator in MBS coverage calculation. Discussion with Banjarmangu 1 Public Health Centre Officer to understanding the wide of malaria problem. Gripit

Village population with estimated population about 1,000 people. MBS officers planned to be divided into three team. Each team contain : registration officer, taking of finger blood and making thick and thin blood smear officer, staining malaria blood smear officer, malaria microscopist officer, health cadre. In step number one determine population target and area in the MBS of malaria, not always in Village scoupe. Target could be Sub Village or a group of houses. Epidemiological analysis need to determining target of MBS. In area with asymptomatic carier represent an important reservoir.<sup>8</sup>

Step number two was socialization and discusion of work plans, determination of malaria MBS pos and teams based on population data. Date and length of MBS, MBS pos in Head of Sub Village houses. Divide team survey collaboration from Banjarnegara District Health officer, Banjarmangu 1 public health center officer, Banjarnegara Health Research and Development Unit Class 1 and Health cadre. Mass Blood Survey done in all time a part of time stay in the Sub Village, people could be tested at every time morning, noon or at night so people could be take blood finger in every time. When socialization we can submitting result from another research that direct cost of malaria in consumed 28-34% of annual income of poor households and 1-2% of high income households.<sup>9</sup> Managemen for success MBS needed and to be shown in step 2.

Step number three Socialization of malaria MBS to the community. Village officer announce time and place of pos MBS to the Gripit Village community through mosque loudspeaker before MBS done and repeat the information when MBS ongoing. Health cadre also

participate in influence community to participate in MBS. There are many way to socialization of malaria MBS to community. In another location probably have different characteristic so the choice of socialization based on local characteristic.

Step number four was implementation of malaria MBS activity. When MBS ongoing 2 registration officer noted identity of participant, 2 officer taking of finger blood and making thick and thin blood smear officer (but when in not busy time each of pos 1 officer), 1 officer staining malaria blood smear, 1 officer malaria microscopist examine with microscope. Health cadre monitoring the incoming participant and reminding them to bring family member. When there is spare time the coverage progress is monitored periodically and find out residents not yet present. Beside the success of MBS coverage, time lapse of microscopic examination must be paid attention.

The final step was Reporting of MBS of malaria. The achievement of MBS 80% of the target can be achieved by monitoring the target achievement in the MBS process and recognizing the target that has not been in MBS for the effort to be taken the blood supply. Reporting MBS malaria useful to determining step hereinafter to eliminate malaria. Social aspect is important in malaria control program. Research shows that family is the most social environment plays a role in prevention of malaria. Neighbour also impact to spread information about malaria control.<sup>10</sup> In MBS activity the role of health cadre very important to push community to join in MBS. Table 1 shows result of malaria MBS in this survey.

**Table 1: Result of malaria MBS in Gripit Village Banjarmangu Subdistrict Banjarnegara District**

No.	Sub Village	Number of community	Number of community stay	Number of community examined	Result of malaria microscopic lab	
					Positive	Negative
1.	Gripit	395	370	299	2	297
2.	Sikasur	230	221	217	0	217
3.	Grumung	419	371	315	0	315
	Total	1.044	962	831	2	829

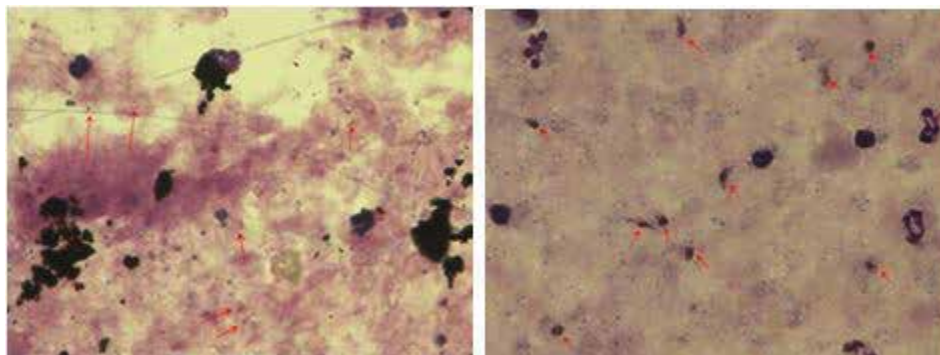
**Information:** Data number of community stay from each pos get from village officer in each pos.

Coverage of MBS in Gripit Village as much  $831/962=86.38\%$ , coverage MBS more than 80% success. Malaria microscopic test show two positive

malaria. One sample positive *Plasmodium falciparum* in gametosit phage with initial AN, male children 9 years old and one sample *Plasmodium falciparum* in ring phage inisial TS, man 22 year’s old without clinical symptom. Research in Afrika showed that the prevalence of asymptomatic malaria 6.8% (n=26).<sup>11</sup>

Children with initial AN one week before take finger blood medicinize to doctor's practice with diagnose not malaria. Before that AN also had been taking malaria blood smear by JMD when Active case Detection

activity with resut negative. Two of malaria cases stay in the same area (RT 2 RW 1/ Griplit Sub Village Griplit Village). Slide with malaria positive show in picture 2



**Picture 2: Plasmodium falciparum ring (i) and P. falciparum gamet (ii) in blood smear from malaria MBS in Griplit Village (pic from compound microscope magnification 1000x)**

## CONCLUSIONS

The result shows that the malaria MBS coverage in Griplit Village was 86.38%, the supporting factors were socialization before the activity, the time of MBS implementation in line with the distribution of the mosquito net (something was given), MBS done all times (morning, noon, night), monitoring MBS coverage in MBS process, health cadres play an active role in bringing villagers that had not join to MBS by examined malaria from blood finger

## ACKNOWLEDGEMENTS

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**Conflict of Interest:** The authors report no conflict of interest in this work.

**Ethical Clearance:** People who participated in MBS activities were not forced and were given an explanation of what would be done including finger blood taking using a sterile lancet, and the volume of blood drops taken. The effect that will be felt is like a needle/thorn. Here also

stated that they were entitled to receive the results of examination of malaria blood smear and receive treatment if the results of the examination were positive.

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# Leptospirosis Outbreak during Rice Harvesting Season in Kebumen, Central Java Indonesia (The First Case Report in Kebumen)

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## ABSTRACT

Leptospirosis, a public health problem in Indonesia, has never been reported in Kebumen before, but Kebumen Public Health Office reported several new leptospirosis cases in this regency during paddy harvesting season in February 2017. A descriptive cross-sectional study was conducted to investigate leptospirosis epidemiology (eg, the reservoir animals, the geographical distribution, and specific populations at risk) in Kebumen on March 2017. Thirty febrile patients were enrolled in Public Health Services and tested for leptospirosis using Leptotek. The positive cases were investigated by interview and site inspection to assess environmental risks. Rat traps were set randomly at housing areas near the positive cases's house in Kuwarasan and Buayan subdistricts. Kidneys were removed from rats and analysed using PCR assay for pathogenic *Leptospira* detection. Thirteen positive leptospirosis cases out of 30 febrile patients were found in 6 subdistricts consisted of Kuwarasan (30.7%), Buayan (30.7%), Karanganyar (7.7%), Gombang (7.7%), Sempor (7.7%) and Sruweng (15.4%). 92,31% of the patients were farmers, indicating occupational exposures at paddy fields. Most of the case were in the age group of 31-40 years (53,85%). High vulnerability among males due to activities in outdoor settings was revealed from male to female ratio (12:1). Clinical symptoms consisted of calf muscle pain (100%), jaundice (84.6%), oliguria (38.5%) and renal failure (15.4%), with case fatality rate was 23,08%. Rats (*Bandicotta indica*) with positive *Leptospira* were found at Kuwarasan subdistrict (6.25%). Based on the results of this study, paddy harvesting season is a critical period associated with leptospirosis transmission in Central Java. Indeed, preventive efforts should be done to avoid leptospirosis outbreak

**Keywords:** leptospirosis, farmer, harvesting season, outbreak

## INTRODUCTION

Leptospirosis is a global health problem which endemic in many tropical areas and causes large epidemics particularly after heavy rainfall and flooding<sup>1</sup>. This disease caused by the spirochetal bacterium from the genus *Leptospira* and transmit from infected animals through their urine, commonly through infected soil and water or infected animal tissue. The most important animal group as *Leptospira* reservoir such as dogs, pigs, and cows, but rats found be the main source of leptospirosis infection in humans<sup>2</sup>. Mainly this disease is zoonosis, with humans serving as accidental hosts. Generally, this disease has been associated with occupational exposures and rural-based farming settings<sup>3</sup>. The World Health Organization (WHO) estimates the incidence of leptospirosis in more than

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500,000 cases per year worldwide, with more incidence in poor populations in tropical developing countries. It is estimated that there were 1.03 million cases of Leptospirosis annually and 58,900 deaths worldwide. Most of cases were found in Global Burden of Disease (GBD) regions of South and Southeast Asia, Oceania, Caribbean, Andean, Central, and Tropical Latin America, and East Sub-Saharan Africa<sup>4</sup>.

Infected animals such as rats with *Leptospira* mostly play a role as carriers, which may not show clinical symptoms of disease. They could excrete leptospires intermittently or regularly for months or years, or for their lifetime. In endemic area, Leptospiral infections in human usually mild or asymptomatic<sup>5</sup>. More severe clinical symptoms likely depends on three factors: epidemiological conditions, host susceptibility, and pathogen virulence<sup>6</sup>. High-risk populations of leptospirosis infection are those who work in rice fields, animal farming, mining, slaughtering, fishing industry, and veterinary medicine. Activities at risk of transmission include river swim activities, hunting, and activities within the forest. Exposure can also occur in daily activities with high risk during the rainy season and flooding. Urban slum dwellers with poor sanitation are also at risk for this disease<sup>7</sup>.

In Indonesia, Leptospirosis seems to be highly underestimated continuous health problem since the lack of community awareness to this disease<sup>8</sup>. Leptospirosis has been reported from 15 provinces in Indonesia, and the higher number of cases has been reported from Jakarta, West Java, Central Java and Yogyakarta with mortality varies from 4.1 to 15.1 percentages<sup>9</sup>. Central Java is Leptospirosis endemic provinces, with the highest number of cases in Indonesia in 2015. During the last 5 years cases of leptospirosis were reported in 20 districts in Central Java. Kebumen Regency reported the first human Leptospirosis cases in 2017 in its area. Up to mid-February 2017, Kebumen District Health Office reported the number of cases of leptospirosis to reach 5 cases with 2 cases of death. All of the leptospirosis patients found in Kebumen are farmers or farm laborers working in rice fields that are entering the rice harvest. Indeed, it is interesting to conduct epidemiological study about this epidemic phenomenon in Kebumen. This study aims to investigate leptospirosis epidemiology (eg, the reservoir animals, the geographical distribution, and specific populations at risk) during epidemic period in Kebumen.

Results of this study will give indepth understanding about epidemiology of Leptospirosis during outbreak, so that prevention effort could be carried out effectively.

## METHOD

**Study Design:** This study was descriptive cross-sectional which conducted to investigate leptospirosis epidemiology (eg, the reservoir animals, the geographical distribution, and specific populations at risk) in Kebumen Regency on March 2017. The research sites for rat catching were carried out in Mangli, Kuwarasan and Sikayu Buayan villages based on the latest case report.

**Data Collection:** Interviews were carried out on patients or families of leptospirosis patients in Kebumen Regency. Verbal consents were obtained before taking 3 ml of blood for serological assay. The collected serum samples were examined with Leptotek Lateral Flow to detect serum anti-*Leptospira* antibodies.

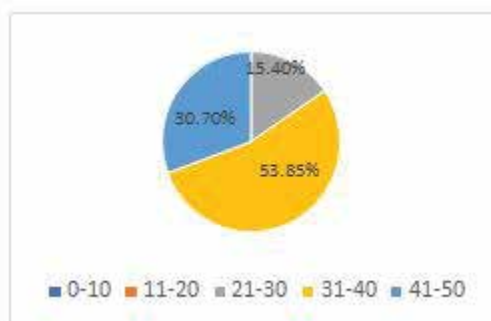
Interviews by questionnaire were conducted to positive case of leptospirosis patients based on an examination with Leptotek Lateral Flow. If the case died, the interview was done to representative of the family. The questionnaire includes information on demographic characteristics, occupation, travel history, clinical information, and possible exposure over the past 2 weeks (contact with rodents, injury and activity in a watery environment).

The catching of rats was conducted by installing 150 single live traps per location in the afternoon. Two pieces of trap were installed in each house, and four pieces for wider house. The rest of traps were installed in the garden and rice fields. Traps were left in place for 2 days and checked every day. The caught rats were sedated with ketamine HCL doses of 50 - 100 mg/kg weight of rats. Subsequently, rats identification was done using identification key. Kidney dissection was carried out for further PCR analysis.

**PCR assay for *Leptospira* Detection:** Kidney of rats were examined by Polymerase Chain Reaction (PCR) following previous procedure to detect the presence of *Leptospira* bacteria<sup>10</sup>. The examination was conducted at the Laboratory of Microbiology, Biomolecular and Immunology Health R & D Unit, Banjarnegara, Indonesia.

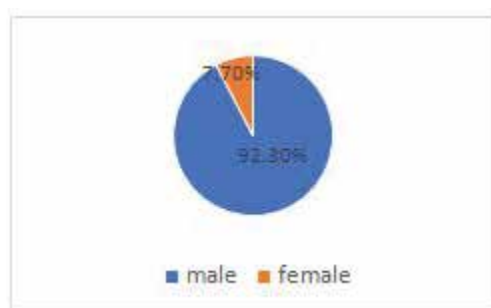
## RESULTS AND DISCUSSIONS

The area of study, Kebumen Regency, had experienced Leptospirosis epidemic that had never reported before, therefore it is important to conduct epidemiological investigation to find out why cases can occur and its risk factors. Based on Leptotek Lateral Flow examination, 13 were found positive results of leptospirosis infection among 30 people examined. From 13 positive cases of leptospirosis found in Kebumen District, 3 of them died (CFR 23.07%). Thirteen people of positive Leptospirosis were distributed in 6 sub districts, namely Kuwarasan (30.7%), Buayan (30.7%), Karanganyar (7.7%), Gombang (7.7%), Sempor (7.7%) and Sruweng (15.4%).



**Figure 1: Age Group of Leptospirosis Patients**

Based on age group of patient, most of cases (53.85%) of leptospirosis cases in Kebumen Regency were from the 31-40 year age group (Figure 1), and most of them were male (Figure 2).



**Figure 2: Leptospirosis Patients based on sex group in Kebumen Regency.**

Current understanding about Leptospirosis showed that outbreaks of leptospirosis usually happened through occupational exposure, such as rice farming and other agricultural activities in rural areas of the tropics<sup>11</sup>. This fact rellevant with the situation in our study area because the outbreak happened during the rice harvesting time. Based on interviews, 92.31% of leptospirosis patients

in Kebumen district worked as farmers/farm laborers in the rice fields, indicating that the Leptospirosis outbreak is closely related with rice farming and agricultural activities. Much of the water needed for rice farming in rural areas is supplied from rivers that are likely to be contaminated with rodents or infected animals. Previous studies from rice-producing countries such as Thailand, Bangladesh, Brazil, India and Iran have also documented Leptospirosis infection which associated with rice fields<sup>12</sup>.

Possible transmission patterns which occurred at leptospirosis outbreaks re contact between hand or foot injuries and contaminated soil or water by mouse urine or direct contact with rats. Significant association with leptospirosis infection in human with the presence of skin wounds, the existence of rodents, especially rats, and activities related to contact with contaminated surface water are factors frequently reported to have in Indonesia and in other Asia-Pacific countries<sup>13</sup>. Farmers and farm workers rarely wear gloves while working in the fields, which increase the risk of transmission<sup>14</sup>. Based on clinical symptoms, almost all patients (84.6%) had jaundice, indicating that the infection had invaded the liver organ. In addition, 15.4% of patients had renal failure.

**Table 1: Clinical Symtoms of Leptospirosis Patients in Kebumen Regency**

Clinical Symptoms	Number of Patients	Percentage (%)
Calf muscle pain	13	100
Jaundice	11	84.6
Fever	9	69.2
Oligouria	5	38.5
Renal failure	2	15.4

The impaired function of liver and kidney indicated delay of treatment that could be caused by mis diagnostic<sup>15,16</sup>. This might be because still lack of awareness to Leptospirosis in both community and health personnel. Increasing knowledge among public practitioners and hospital staff to facilitate early recognition and treatment of leptospirosis are very important. Clinical symptoms of Leptospirosis described in Table 1.

The results showed that the composition of rats caught in the subdistrict of Kuwarasan and Buaran sub-district was similar. In Kuwarasan sub-district, 26 rats species were *Bandicota indica*, *Mus musculus*, *Rattus tanezumi* and *Suncus murinus*. The most widely caught species was *Rattus tanezumi* (Figure 3).

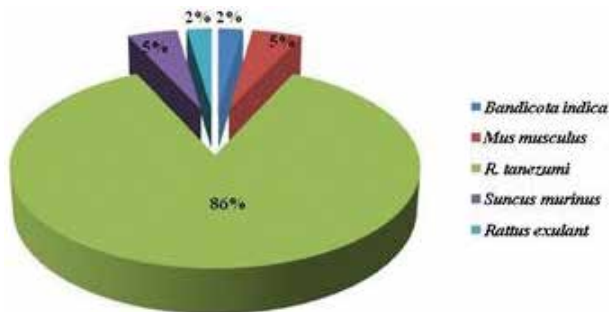




**Figure 3: Distribution of captured rats in Kuwarasan Sub District**

The results of PCR examination on rats in Kuwarasan Sub district showed that one mice of *Bandicota indica* species was positive containing *Leptospira* pathogen.

The number of rats that were caught in Buaran Sub-district was more than the number of rats caught in Kuwarasan Sub-district, which were 43 rats. Rat species which caught in Buaran Subdistrict includes *Bandicota indica*, *Mus musculus*, *Rattus tanezumi*, *Rattus exulant* and *Suncus murinus*. The widely caught species was *Rattus tanezumi*.



**Figure 4: Distribution of Rats Caught in Buaran Sub District**

The results of PCR assay on rats samples in Buaran sub district showed no positive *Leptospira* bacteria. Detection of anti-leptospira antibodies in leptospirosis patients and detection of pathogenic *Leptospira* genes in captured rats in the area of study indicated that rats play an important role as reservoirs and sources of infection. Increased rat populations can lead to an increase in the number of leptospirosis infections in the human population in the future<sup>17</sup>. Minimize contact with rodent should be done to risky workers such as farmers to prevent disease transmission. Personal protective equipment such as gloves and boots should be worn while working in the fields. Rodent control, improved hygiene, and preventing rodents in the surroundings

area several methods to minimize the route transmission between rodent and human<sup>18</sup>. Trapping rodent to removal of animals rather than reducing the suitability of the environment for rodents will have the greater impact on reducing human cases of leptospirosis<sup>19</sup>. Further plan and work should be involved collaborative actions involving agriculture, health and veterinary to prevent the disease. The occurrence of outbreaks in the harvest season should also be a concern for farmers to be able to do prevention.

## CONCLUSIONS

The outbreak indicated a local transmission of leptospirosis which related to occupational exposure in rice harvesting season. Detection of anti-leptospira antibodies in leptospirosis patients and detection of pathogenic *Leptospira* genes in captured rats in the area of study indicated that rats play an important role as reservoirs and sources of infection. Increased rat populations can lead to an increase in the number of leptospirosis infections in the human population in the future

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# Housing Condition as Tuberculosis Infection Risk Factor

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## ABSTRACT

Indonesia is a country with the third tuberculosis (TB) incidence in the world. Bandar Lampung is one of the cities in Indonesia with a high TB incidence. TB incidence in the city increased about 80% during four years period (2,056 cases in 2016 compared to 1,195 cases in 2012). Bandar Lampung is located in the fifth poorest province in Indonesia, which closely related to poor housing condition. This study aimed to identify significant influence of housing condition, which consisted of variables: ventilation, in-house sunlight, in-house smoking pollution and in-house TB contact; to TB infection. A case control study was used to study the influence of related variables. Case sample group consisted of 31 smear-positive TB patients; meanwhile control sample group consisted of 62 patients without TB. Both sample groups were obtained from Sukaraja and Panjang Community Health Service which have performing Directly Observed Treatment Shortcourse and have highest TB incidence in Bandar Lampung. Data were collected by using structured interview questions and observation; and was then analyzed using bivariate Chi square analysis. Less ventilation (odds ratio/OR: 4.747; 95 % confidence interval/CI: 1.875–12.022), no in-house sunlight (OR: 5.219; 95 % CI: 2.040–13.355), existence of in-house smoking pollution (OR: 3.067; 95 % CI: 1.240–7.584) as well as existence of in-house TB contact (OR: 10.688; 95 % CI: 3.792–30.121) are TB infection risk factors. In conclusion, TB control program should be highlighted the concerned variables in order to accelerate TB incidence reduction, especially in countries with poor housing conditions.

**Keywords:** *housing condition; tuberculosis; risk factor*

## INTRODUCTION

Indonesia is a country with the third tuberculosis (TB) incidence in the world. The number of TB incidence in 2016 was 1,020,000 (660,000 – 1,460,000)<sup>1</sup>, increased 122% compared to TB incidence in 2012 which was 460,000 (380,000 – 540,000)<sup>2</sup>. Bandar Lampung is one of the cities in Indonesia with a high TB incidence. Moreover, TB incidence in the city also increased about 80% during four years period. TB incidence in 2012 was 1,195 cases, increased to 2,056 cases in 2016<sup>3</sup>. Bandar Lampung also a city in Lampung province, a fifth

poorest province in Indonesia. One of indicators of poor province is poor housing condition<sup>4</sup>.

Housing condition is socio-economic indicator of health and welfare related to the environment<sup>5</sup>. Poor housing condition is linked to poverty, which increase vulnerability to disease<sup>6</sup>. Poor housing condition includes such as poor air ventilation, poor in-house sunlight and existence of in-house smoking pollution<sup>7</sup>. Poor air quality in the house as a result of insufficient ventilation and the presence of cigarette smoke contribute to decreased respiratory health and have impact to TB transmission. Moreover, poor air quality caused by in-house smoking pollution can disrupting the mucociliary defense function of airways, impair alveolar pulmonary macrophages function and make the lung vulnerable to infection, including TB<sup>8</sup>. This condition is deteriorated by the presence of in-house TB contact, which will increase the probability of in-house TB transmission<sup>9</sup>. This study aimed to study whether TB incidence in Bandar Lampung is associated with an increasing poor housing condition.

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## METHOD

This study was a case control study, conducted at Sukaraja and Panjang Community Health Centre (CHC), which had the highest TB incidence in Bandar Lampung. Population of this research consisted of case and control population. Case population was TB smear positive patients during period of January – April 2016 in the study sites, which were 35 TB smear positive patients. Meanwhile, control population was TB suspect which have been confirmed did not suffer TB in the same study sites and period, which was 147 patients. Case sample was all population which was eligible, those was 31 TB smear positive patients. Meanwhile, control sample was twice as case samples, those were 62 patients.

Research variables in this study consisted of ventilation, in-house sunlight, in-house smoking pollution, in-house TB contact and TB infection. Ventilation was measured by percentage of ventilation area of house width (less ventilation: <20%, adequate ventilation:  $\geq$ 20%)<sup>10</sup>. In-house sunlight was observed by existence of sunlight in-house (there was no in-house sunlight, there was in-house sunlight)<sup>10</sup>. In-house smoking pollution was indicated by existence of family member who smoke inside the house (there was in-house smoking pollution, there was no in-house smoking pollution)<sup>11</sup>. In-house TB contact was indicated

by existence of TB contact inside the house (there was in-house TB contact, there was no TB contact).

In this research, data was collected through in-depth interview, observation and measurement. Data was then analyzed using bivariat analysis Chi-Square to identify the significance (p value) and significant influence (odds ratio/ OR) of each independent variable to dependent variable.

## RESULTS AND DISCUSSION

This result shows that there are more respondents in case group (smear positive TB respondents) who most live in a house with less ventilation (56.2%), no in-house sunlight (58.1%), existence of in-house smoking pollution (50.0%) as well as existence of in-house TB contact (70.4%); compared to respondents in control group (respondents with no TB infection). Respondents in control group most live in a house with adequate ventilation (78.7%), have in-house sunlight (79.0%), have no in-house smoking pollution (75.4%) and have no in-house TB contact (81.8%) (table 1). Based on the bivariat analysis using Chi Square, it is also shown that all of research variables have p value of less than 0.05. In addition, existence of in-house TB contact is categorized as variable with the highest OR (OR: 10.688; 95% Confidence Interval/ CI: 3.792 – 30.121) among the other variables (table 1).

**Table 1: Bivariat Analysis of Housing Condition to TB**

Variables	TB Infection		p value	OR (95% CI)
	Yes	No		
<b>Less ventilation</b>				
Yes	18 (56.2%)	14 (43.8%)	0.001	4.747 (1.875–12.022)
No	13 (21.3%)	48 (78.7%)		
<b>No in-house sunlight</b>				
Yes	18 (58.1%)	13 (41.9%)	0.001	5.219 (2.040–13.355)
No	13 (21.0%)	49 (79.0%)		
<b>Existence of in-house smoking pollution</b>				
Yes	16 (50.0%)	16 (50.0%)	0.025	3.067 (1.240–7.584)
No	15 (24.6%)	46 (75.4%)		
<b>Existence of in-house TB contact</b>				
Yes	19 (70.4%)	8 (29.6%)	< 0.001	10.688 (3.792–30.121)
No	12 (18.2%)	54 (81.8%)		

OR: Odds ratio

CI: Confidence interval

In this research, existence of in-house TB contact is the strongest risk factor to TB infection. TB contact is the source of TB transmission. The transmission risk is greater when index case is sputum smear positive<sup>12</sup>. Research result in Pakistan showed that in-house smear positive TB contact has probability of 11.73% to transmit smear positive TB to in-house family member. In addition, he also has probability of 9.6% to transmit smear negative TB to in-house family member<sup>9</sup>. Family members who have more intimacy and contact duration to in-house TB contacts have greater risk to have TB infection rather than family member who have less intimacy and contact duration of family member to in-house TB contacts<sup>12</sup>. Research in India showed that a husband with smear positive TB rarely transmits his disease to his wife but more to his mother, due to social structure relationship which refer to intimacy. The disease can get most manifested in in-house family member within the first four months of the active disease of the smear positive in-house TB contacts. Although, the disease also can get manifested during the active disease of in-house TB contacts or even after 4 – 24 months of successfully treating the smear positive TB contacts<sup>12</sup>.

In this research, in-house TB contact influences TB infection together with less ventilation, no in-house sunlight as well as existence of in-house smoking pollution, which refer to poor housing condition, especially poor in-house air quality. Previous research showed that most of TB patients in Bandar Lampung, Indonesia, clustered in areas with poor housing condition<sup>4</sup>. Moreover, in Bandar Lampung, Indonesia, among other TB infection risk factors (food security and health access), poor housing condition is the greatest risk factor<sup>13,14</sup>.

Based on observation, most of case sample's respondents live in slum areas which are densely populated residential areas and crowded houses. Moreover, most of their houses are small houses with fewer windows or even cannot be opened windows due to crowded houses surrounding their houses. This condition caused the houses have less ventilation and less or even no in-house sunlight. The condition also makes worse in-house air quality if there is in-house smoking pollution.

Tuberculosis was spread via respiratory tiny particles droplets containing *Mycobacterium tuberculosis*, which would rapidly evaporated, leaving droplet nuclei. These

tiny particles would remain suspended on in-house air until either inhaled or ventilated out of the house. Therefore, in a house with less ventilation, droplet nuclei might remain suspended in the in-house air for prolonged periods, which mean will increased risk to be more inhaled<sup>15</sup>. However, droplet nuclei would not remain on in-house air with good in-house air circulation and adequate ventilation. In the other hand, most of respondent's case sample houses in this research have less ventilation which will increase the risk of transmission and infection, with OR: 4.747 (95% CI 1.875–12.022). This result concurs with research in Canada showing that more than two-third of 153 houses in endemic and epidemic TB areas had poor ventilation system<sup>16</sup>.

Droplet nuclei are also susceptible to ultraviolet light, including sunlight. Therefore, sufficient in-house sunlight is needed to control *M. tuberculosis*<sup>7</sup>. In a house with have less or even no in-house sunlight, risk of droplet nuclei to be inhaled will increase which also increase TB transmission and infection probability<sup>17</sup>. In this research the risk of no in-house sunlight to TB infection is 5.219 (95% CI 2.040 – 13.355).

In this research, TB infection is also influenced by in-house smoking pollution. Smoking pollution will impaired the normal mucociliary clearance of tracheal bronchial secretions and alveolar macrophage function, therefore it will weakening resistance to *Mycobacterium tuberculosis* and increasing of risk infection<sup>18</sup>. In this research, the probability of existence in-house smoking pollution to increase risk of infection is 3.067 (95% CI 1.240 – 7.584).

## CONCLUSIONS

This research shows that poor housing condition consisted of: less ventilation, no in-house sunlight, existence of in-house smoking pollution as well as existence of in-house TB contact are TB infection risk factors. Therefore, TB control program should be highlighted the concerned variables in order to accelerate TB incidence reduction, especially in countries with poor housing conditions.

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**Conflict of Interest:** The authors declare that there are no conflicts of interest.

**Ethical Clearance:** Ethical clearance for this research was obtained from Faculty of Medicine University of Lampung. Moreover, the respondents in this study has received informed consent prior to the study and participated on voluntary basis.

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# Early Marriage In Adolescent Opinion

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## ABSTRACT

**Background:** Indonesia is a developing country with high percentage of young age marriage in the world. Female citizens who married with first marriage in 16 years old about 14.35%. Education association vocational senior high school Samarinda located on Samarinda Ilir. On 2014-2015 it was noted that teenagers who married aged 13-16 years old at 9 cases and become at 19 cases. The young marriage can effect for youths healthy.

**Method:** This research was qualitative study used descriptive approach. Research subject were male and female students class X in education association vocational Senior High School Samarinda, consisted of 6 informants, 1 support informant, and 1 key informant. Data collecting technique used snowball sampling.

**Results:** According the informant, early marriage in adolescent opinion in male and female students in education association vocational Senior High School Samarinda, early marriage in adolescent opinion is something scary and nothing special in this time, in the other hand, the other opinion showed the early marriage as something challenging and must try in their life.

**Conclusion:** There were 2 different opinions about early marriage. 2 informants disagree about early marriage because they want focusing on study and want to make parent happy, the other 4 informants agree about early marriage due to avoid the Zina and their can apply it after graduation school. The differences of opinion informants about early marriage in adolescents. There are those who agree to some who disagree with the reasons they expressed view of the current conditions.

**Keywords:** *Early Marriage, Adolscent, Sexual Behaviour Oppinion*

## INTRODUCTION

Teenager is period full of konflik, because in this section is change period that change of body, behavior and character that expected by social groups, to search indentity for lifting theirsself as an individual. The Change for teenager sometimes has terribel change by the teenager and always cause the problems<sup>1</sup>.

Teenager problems always appear both of out of county and in the country , however goverment always trying to keep in cooperation on some the best institution

from education indtitution, family or organisation who involves teenager on their program, for every teenagers always in teenager goodline and far from the activity or bad behavior. Social problem and academic are problems that always emerge and make big attention by the teenager. The real example that always in real life are so many fight accidents between teenagers who caused simple problems, teenagers who do suiciding because had konfilk with their boyfriends, or people around them, teenagers who have stress because their achievement down, then turn to drug, alcohol and freesex and so many teenagers who victimize their period wasted without supervision.

Marriage at a young age currently have become so many things that happen, especially after they finishing their education in top level, then many from teenagers are not continue their school and will marriage. And also, there is marriage by teenager who still study in school, so many dropouts because their marriage if that marriage

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based because they have pregnant before marriage, one of the shape of the responsibility that will their do is quit from their school.

Based on Bappenas projection, total number of the teenagers in 2014 is 66 million people or about 27% from total 255 million people in Indonesia and about 142 million girls or 14,2 million per/year marriage before 18<sup>th</sup>. According Survey Data Demografi and Indonesia residency (SDKI) in 2007 there are 9,1% or almost about 9 milion women who pregnant that not their want because their free association. Harm condition and harm the soul that experienced by the teenagers that become teenagers decided to getting marriage at a young age<sup>3</sup>.

Marriage at young age in the last 30 that make decline from 33% become 26%, however, the prevalence of marriage in age under 15 years still konstan from in the year 2000 untill in the year 2010. And teenagers who marriage in the 18<sup>th</sup> still very high.

Teenagers who Marriage at a young age can impact in teenagers health, both of physically and psychic. Marriage in young age impact to some of the things, there are : premature child birth BBLR (berat badan lahir rendah), violence to the children, abandonment to the children, low of self esteem, not harmonious in household, divorce<sup>4</sup>. In Indonesia on of the developing country with percentage of high marriage in young age (rank 37), the second highhestin ASEAN after Kamboja. In the year 2010, there are 158 countries with over 18<sup>th</sup> legal age minimum marriage, and Indonesia still in out of it. The young women Indonesian with age 10-14 years marriage were 0.2% or more than 22000 young women in the age 10-14 years in Indonesian who have to marriage. The total from young women in the 15-19 years who marriage more than if comparison with young man in the 15-19 years(11,7%P:1,6%L)<sup>5</sup>.

One of the provinces in Indonesia, that entering the top 10 figures of marriage at young age there is East Borneo was in third place after South Borneo and West Java, with population of women that ever marries according to their first marriage at 16 years as many as 14,35%, did their first marriage at the age of 17-18 years as many as 21,48%, and did the first marriage at 19-24 years as many as 15,68%<sup>5</sup>. Getting marriage at a young age is the one causes of disruption of reproductive health. If the younger the age to getting marriage that the more long range of the time to production.

Based on the result of Susenas at 2014 the most of the women at the age over 10 years that have been marriage and birthing with the number of children born alive there is 1 person as much as 28,9%, with 3 children that born alive as much as 19,53%, and with 4 children who born alive as much as 9,52%, but there are also never had children born alive as much as 6,62%<sup>6</sup>.

Not only in the matter of the world, data about getting marriage at a young age recorded until a smaller area, as in these areas. We can access education institution to find teenagers, which 100% contains teenagers at risk who getting marriage at a young age. Almost all areas have number of early marriage, this data never decreased each year, but always have an increased, so need to find out how the the teenager's vision about marriage at a young age among adolescents themselves.

## METHOD

This Research use kualitatif research with using Descriptive approach which aims to the full picture about the object that researched. In this case research's subject there are students that study in SMK Yayasan Pendidikan in Samarinda. This research using snowball sampling technic, using the technique of triangulation of sources.

## RESULTS AND DISCUSSIONS

The perception of getting marriage at a young age on students from the research result obtained different from students about their perception of marriage at a young age. There were 2 informants said, do not agree to marriage at young age for the reason they want to make their parents happy and focus for their school. They said that getting marriage at young age that can hinder their education and can't make their parents happy. There are 4 another informants that agree to marriage at young age for the reason marriage at young age better to avoid from zina and they assumed marriage at young age is a challenge and can provide new experience in informant's life.

Even so, the both of this informant ended with the same answer , all of teenagers that in the one top level school desirous to marriage at young age after they have graduation from Senior High School and at 20 years.

The influence of the environment against the phenomenon of marriage at young age for students. In



the research at the top level school for students who want to getting marriage at young age because the informants are surrounding people who had made a marriage at young age . the most of the informants said, they have neighbors, friends, family or person who close to their that have marriage at young age. This line depends on the soekarno's research (2011), that environment, place and level of education influential to increases the age to first marriage<sup>7</sup>.

According with Green's theory in Notoatmojo<sup>7</sup> who exposed *Precede-Proceed* theory . Green analyzed behavior using *Preeced*. The behavior in this research can be defined as the perception of students of marriage at young age. This Precede model described that the behavior specified or form of 3 factors. The factors are predisposisi is the factor that factor to simplify to occurrence of behavior, there are knowledge, attitude, conviction, tradition, reliance, perception, and so on. The second factor is Enabling factor is factors facilitate behavior or action such as the facilities and infrastructure (Puskesmas, place to live, school). The last factor is encourage or reinforce the occurrence of a behavior.

In this research there is factor that has the same with one of factor in green's theory there is Enabling Factor, in this case that mean the environment of neighborhood and school that affect the student's desire for getting marriage at young age. The view towards of peers have marriage and *Role model* be an inspiration. Almost all of the informants said they have peers who have marriage at young age, the viewed all of the informants are different. Some of the informants assume that the peer who have marriage at young age was the scary thing because almost all of informant's friends marriage because Marriage by accident and end on divorce.

All of informants said they ever hear marriage at young age by electronic media and print media, as Facebook and instagram, and magazine. This shows that students who study at top level are not previous from progress of the technology information that know all happen quickly in community, include marriage at young age. Each informant has one figure that marriage at young age that obtained through facebook and Instagram and be role model in desire to marriage at young age, figures that be role model from various backgrounds there are artist, selebgram, and their own family.

The different viewed from the informants about peer who marriage at young age they have the same desire

marriage at young age and become artist, selebgram and their own family as the informant inspiration to marriage. The role of the parents very needed in teens view of marriage at young age, will happen the good synergy by the teenagers, institution of education, and also family, as the firs house from teenager to shedding all of their problems. If parents have attention to the development of adolescents, of course the parents will give a strong fortress scientific that the good and bad action by teenagers. But it is unfortunate if parents very let their teenagers to explore their life in outside by herself without the real guidance, then in teenagers who can sorting out the good association that will make the teenagers be the good person without do bad measure that can damage teenager's future, but it the teenagers can not restrain solicitation the bad association, ascertained the teenagers will entry into the group and it will be difficult to return them in the right way<sup>11</sup>.

The corellation of marriage a young age with health From the research results at top level school showed that only 2 informants who know the relation of marriage a young age with health, 1 informant said the marriage a young age there is no connection with health, but the informant said getting marriage at young age can impact to trouble of economy because not yet established and the other informants said they didn't know the relation between marriage a young and health.

This in confirmed with the support informants that said students in top level school don't get a lesson of reproductive health. If teenagers do the marriage a young age, then after marriage of course there is process of pregnancy, in the process of pregnancy the teenager's body that should still do the growth process than should divide it to a fetus conceive, because the fetus will always developing until 9 months pregnancy the fetus is ready to born and be a baby<sup>10</sup>. On the process of the birth indirect causes of the mom death is too young, it also as evidence basically on the young body haven't been able to two life, both of for herself or the prospective life her son.<sup>12</sup> For baby is at risk born in the weight less than 2500gr condition that can the occurrence of various diseases at risk as the cause of the baby death in a year for baby's first life.

## CONCLUSIONS

Based on the research of teen views to the marriage at young age in the top level school with the conclusion

that the teen opinion of marriage at young age is the the scary thing at the same time also deemed challenging by some of teenagers.

There are 2 different views between the perception of marriage according by female students and male students. The male students are not agree with the reason if marriage at young age can block the desire to make parents happy, while the perception of marriage at young age by female students they are agree to marriage at young age in order to avoid from zina.

Each informants have one figure who marriage at young age that from facebook and instagram and be role model of the desire to get marriage at young age, the figures that become role model from various backgrounds there are artist, selebgram, and the family who close to them. The different view from informants about peer who marriage at young age it ends with a desire to marriage at young age and make the figures, selebgram and family as inspiration person of the informant to marriage.

The right provide information to teenagers in top level school will delivering the teenager to choose their future direction without a sense of regret in the later, so the sense of responsibility that teenagers had can passed by wholeheartedly. The good cooperation between family, school, friend the neighborhood teenagers as well as private teen self be the strong handle of teenager to choose their future well and maximum.

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**Conflict of Interest:** There is no conflict of interest in this research

**Ethical Clearance:** In this study will begin by going through the permission stage by the school first, then the selected respondents are given an informed consent as the first explanation in the research flow where they will be involved in it.

**Source of Funding:** This Research is independently by researcher

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# The Effect of Narcotics Anonymous Meeting toward Relapse Prevention among Prisoners

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## ABSTRACT

Narcotics has been becoming transnational problem which was involving many sectors, include prison. Increasing of drugs abuse and criminalities caused increasing of prisoners. This problem was not only a social problem, but also health problem, especially mental health problem in prison. In fact, prison and punishment did not effectively heal their criminalities and also their addiction toward narcotics. Unfortunately, it precisely made a hidden movement of narcotics inside prison. It was necessary to build a program to prevent bad practice among prisoner and heal their addiction. One of the effective ways to solve the problem is rehabilitation in prison. But, rehabilitation could not sustain without desire to prevent relapse. This research aimed to know the effectiveness of NA meeting toward relapse prevention among the prisoners. This research is an experimental study which was initiated in Samarinda Narcotics Prison, East Kalimantan. NA meeting were held among 30 participants, divided over 2 groups. The meeting has been conducted once a week for 3 months. Data collected by pre and post-test. Results show that participants have a different level of attitude about relapse prevention of drugs abuse. According to statistical test, this study presenting the value of  $p=0.0001$ , which we can conclude that there is significant effect of NA Meeting toward relapse prevention among prisoner. In addition, there is fair enough correlation ( $r=0,660$ ) between NA meeting with relapse prevention among prisoner. Interventions focusing on support group, education and rehabilitation may improve relapse prevention among prisoner.

**Keywords:** *prisoner, narcotics anonymous, relapse prevention*

## INTRODUCTION

Narcotics are one of the most problems in almost all countries. Narcotics crime has been becoming transnational crime which involving many factors, such as trafficking crimes, financial crimes, and high-tech crimes<sup>1</sup>. Increasing of criminalities of drug abuse is linear with increasing amount of prisoners and also the problem inside it. In many case, prison have been over capacity of prisoners, even more than 300% in

Samarinda, Indonesia<sup>2</sup>. Some solutions were performed to solve the problem, once of the most preferable is rehabilitation within prison.

As in Indonesia, National Narcotics Board have been already successfully rehabilitating around 18.311 addicts (include in prison) and reached 7.829 ex-addict which was given therapy trough aftercare program<sup>3</sup>. Not many therapy methods are effectively healing the addiction, but there are several methods based on evidence which successfully give clean period much longer, such as Therapeutic Community (TC) and Narcotics Anonymous (NA), both of them are self-help therapy. TC needs more professional in residential program and also more firm in new behavioral forming. NA has the free system with meeting as a media to help addicts grow their desire to stop using drug or at least have fewer tendencies of using drug<sup>4</sup>.

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Narcotics Anonymous is a global community-based organization with various membership which was established in 1953. For the first twenty year, the membership is still insignificant, but after the publication of Basic Text in 1983, the number of members and meetings has increased significantly. Based on membership survey in 2016, NA members hold nearly 67,000 meetings weekly in 139 countries. NA provides recovery from the effects of addiction through working a twelve-step program, including annual attendance at group meetings. The environment of group provides help from peers and presents an ongoing support network for addicts who have a willingness to pursue and maintain a drug-free lifestyle. Narcotics Anonymous is not meant to advice a focus on any particular drug; NA's approach makes no difference between drugs including alcohol. NA has no affiliation with government, faith-based organization, law enforcement groups, or medical and psychiatric associations<sup>5</sup>. The meeting can be held independently, but in Indonesia, mostly the meeting is facilitated by Community-based organization which conducting a rehabilitation program for addicts.

Relapse is a condition where people fall into drugs after recover. Preventing relapse can affect in preventing more unlawful behavior, increasing mental health and also prevent from unwell-being life. One of program of relapse prevention is mindfulness and spiritual-based program, which is a good way to increase psychological well-being<sup>6</sup>, include in prison. However, it is important to know the effectiveness of NA meeting towards relapse prevention for sustainable rehabilitation among prisoners.

## METHOD

This research is an experimental study which was conducted in Samarinda Narcotics Prison, East Kalimantan. Participants were recruited purposively because of special nature of a prison, participants had to be selected by the staff first to ensure our safety, only drug users who had experience of rehabilitation were included. Nevertheless, to avoid a potential selection bias, we required the staff which had no direct interactions with drug users to select participants and considering about their length of drug crime sentence.

A total 57 participants (divided into 4 groups) were involved in this study, but only 30 participants (in 2 groups) which completed the baseline (pre), intervention (complete 12 meetings) and end-line

(post) test. The treatment to participants was delivering guidance how to conduct the meeting, the steps, and traditions. Furthermore, every meeting was facilitated by a complete NA guidance, so the participants could conduct the meeting independently. Every group has the chairman of meeting to lead the participants for sharing and support each other. Only addicts could talk in this meeting and the topic should be about hope, strength and experience of abstinence from drug. Each group was observed while meeting conducted. The meeting was conducted once a week for 3 months. Data collected by pre and post-test.

Descriptive statistics was used to measure all variables: age, level of education, drug of choices, lengths of use drugs. Therefore present by frequency, and percentages. Wilcoxon signed rank test was used to measure different between pre-test and post test scores. The significant different was define as p value < 0.05.

## RESULTS AND DISCUSSION

This study is presenting some data about participant's characteristics which is categorized by age, level of education, drug of choice and length of use. Below is the result of study:

**Table 1: Participants' Characteristics in Samarinda Narcotics Prison**

Respondent's Characteristic	F	%
<b>Age (years old)</b>		
<20	1	3,3
20-25	2	6,7
26-30	6	20,0
31-35	9	30,0
>35	12	40,0
<b>Level of Education</b>		
Elementary School	3	10,0
Junior High School	10	33,3
Senior High School	15	50,0
University	2	6,7
<b>Drug of Choice</b>		
Methamphetamine/Shabu	23	77,7
Amphetamine	1	3,3
Marijuana	1	3,3
Ecstasy	4	13,3
Inex	1	3,3

Conted...

Length of Use (year)		
<1	6	20,0
1-3	7	23,3
3-5	3	10,0
> 5	14	46,7
Total	30	100

Source: Primary Data, 2017

Based on table 1, the most age of participants is >35 years old (40%). 50% of participants are completed education at senior high school level. Methamphetamine is noted as the most drug of choice (77,7%) and majority length of use drugs among participants are more than 5 years (46,7%).

According to baseline survey before the intervention, some data are collected about internal factors which initiate someone to use drug even if they have already recovered. Below is the result:

**Table 2: Participant’s Distribution based on Internal Factor Causing Relapse**

Internal Factors	Yes		No	
	F	%	F	%
Fear	14	46,7	16	53,3
Lack of care	6	20,0	24	80,0
Angry	18	60,0	12	40,0
Feeling guilty	13	43,3	17	56,7
Timidity	24	80,0	6	20,0
Sadness	20	66,7	10	33,3
Stress	12	40,0	18	60,0

Source: Primary Data, 2017

Table 2 shows that there are many conditions which lead participant to use drug again, such as Timidity (80,0%), Sadness (66,7%), angry (60,0%), fear (46,7%), feeling guilty (43,3%), stress (40,0%), lack of care (20,0%). Besides, the attitude towards relapse prevention shows the different score before and after intervention. Below is the result:

**Table 3: Participant’s Distribution based on Attitudes toward Relapse Prevention Before and After NA Meeting**

Attitude toward Relapse prevention	Before		After	
	F	%	F	%
Positively prevent relapse	13	43,3	22	73,3
Negatively prevent relapse	17	56,7	8	26,7
Total	30	100	30	100

Source: Primary Data, 2017

Table 3 indicates that attitudes toward relapse prevention are increasing positively. Before the intervention, there is 13 participants (43,3%) which positively prevent relapse and after intervention the amount of people is significantly increase become 22 participants (73,3%). In opponent, the people who give negative attitude toward relapse prevention are decreasing after intervention. The effect of NA Meeting toward relapse prevention is analyzed by Wilcoxon Signed Rank Test based on pre-test and post-test score. Below the result of analysis:

**Table 4: The Effect of NA Meeting Toward Relapse Prevention among Participants**

Result of Pre-test and Post-test	F	p-value	ρ/rSp
Positive	23	0,0001	0,660
Negative	3		
Ties	4		
Total	30		

Source: Primary Data, 2017

Table 4 shows that after measurement of score pre-test and post-test, there is 23 participants who experience increasing of attitude about relapse prevention (from negative to positive), 3 participants who experience decreasing score of attitude toward relapse prevention and 4 participants do not change their attitudes. Based on statistical analysis, this study obtain p-value 0.0001, which is mean that there is a different attitudes before and after intervention (NA Meeting). The correlation coefficient shows the number of 0.660, it means that there is strong enough influence of NA Meeting toward relapse prevention.

**Addiction, Recovery and Relapse:** Based on the results, all participants are in the productive age with length of

use drug are more than 5 years, which is indicate that first time of using drug in the young age. Addiction is the condition for someone where they could not control their drug use. Once they stop, it will cause an effect for their physical and psychological. The most dangerous situation is it can cause the hidden movement within prison. To hand over this situation, some programs are performed, such as reducing demand, restricting supply and building recovery, include in prison<sup>7</sup>. In case of recovery program, it is easy enough to make addicts clean physically, but it is difficult enough to make addicts stay clean physically and psychologically. Another research found that recovery is fragile. Recovery was described as being unsure and temporary as well as somewhat never-ending<sup>8</sup>. This will lead to a statement that addiction is a chronic disease, which can perform relapse after abstinence. That is why, recovery is both attainable and sustainable with proper support to prevent relapse<sup>9</sup>.

Also according to results, there are several conditions which lead someone to relapse, such as timidity, sadness, angry, lack of care, feeling guilty, stress and another unpleasant feeling. It suitable with prison's condition, whether stay in prison or after release, prisoners have a stressful condition such as jobless, facing stigma, lack of housing and another challenge of recovery. A previous study showed that the most common type of reason given for relapse was negative emotion states. The elements of negative emotions are low mood or sadness, frustration, anger, anxiety, and resentment that all are responsible for causing relapse<sup>10</sup>. Another study also presents that low internal motivation and helplessness will effect to lower control over drug use<sup>11</sup>.

**Effect of NA Meeting toward Relapse Prevention:** The attitudes about relapse prevention are different before and after NA meeting. The scores of attitude are increase significantly. It also shows that there is a will of prisoners to improve their life into a drug free lifestyle. NA well-known as a support group which main prerequisite are willingness of abstinence by encourage member to heal their self by sharing each other. Moreover, mutual self-help program, have been proven to be efficacious in promoting abstinence<sup>12</sup>. Abstinence is also indicate that the participants can control their craving of drug or prevent relapse.

As a support group, there are many things which have to be deal with, such as attendance of NA meeting.

In this study, NA meeting produce more positive effect toward relapse prevention among participants. There is increasing of willingness to avoid trigger factors to relapse. Although they will release from prison, they have desire to connect with the meeting outside prison. This finding is in line with literature where presence at NA self-help group has continuously been proven as related to, or predictive of abstinence and better outcomes post-treatment, include preventing relapse<sup>13,14,15</sup>. Involvement in NA meeting is also contribute to lower psychological distress, psychiatric symptoms and made patient more likely to be abstinent one year after formal treatment<sup>13</sup>.

This study found that attending NA meeting once a week gave a significant change of attitude toward relapse prevention. This finding is in line with previous study, which attending groups meeting 1-2 times a week had an abstinence rate of 66,67%, while those attending 3-5 per week showed an abstinence rate of 76,5%, and those attending daily reported the highest abstinence rate of 85,7%. This study also present a significant association between attendance of drug monitoring group and abstinence ( $p=0,001$ )<sup>16</sup>. Although this study present the positive result to relapse prevention after 3 months of intervention, it is valuable to develop a comprehensive program within prison, which focusing on support group, education, and rehabilitation.

## CONCLUSIONS

Relapse prevention is an important skill to maintain abstinence. Prison should have paid more attention to the health of prisoner, especially mental health. This finding suggests interventions focusing on support group, education and rehabilitation may improve relapse prevention among prisoner. Prison can provide some capacity building to the prisoners about relapse prevention and support them with group counseling regularly.

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**Conflict of Interest:** There is no conflict of interest in this research.

**Ethical Clearance:** The study was accepted after a

complete internal review of proposal that adjudicate to involve some staffs of prison to control the interventions. Participants were informed about the objective of the research and that they were free to participate or leave the research at any point which will not prohibit their rights. Written informed consent was obtained from all participants before data collection.

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# The Analysis of the Factors affecting Medication Adherence in Patient with SLE (*Systemic Lupus Erythematosus*) at Yayasan Tittari Griya Kupu Solo

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## ABSTRACT

The prevalence of systemic lupus erythematosus (SLE) in Indonesia was considered high (approach 100.000/year). Medication adherence was essential for the control of symptoms and progression of SLE. This study aimed to measure the prevalence of medication adherence and analyze associations between socio-demographic, duration disease, number of currently used medicines and side effects of medication adherence in patients with SLE. The research used descriptive, analytic method held from February 2018 to April 2018 with the total of 41 respondents. The data were collected through questionnaire and individual interviews. Medication adherence was assessed by interviews based on the Morisky Green Levine Scale (MGLS), and the associated factors (gender, age, level of education, occupation, income, duration of disease, number of currently used medicines, and side effect) were analyzed using chi-square test. Twenty-two patients (53,65%) were using combination drug while 19 patients (46,34%) were using a single dosage form. The percentage of patients classified as non-adherence to treatment was 36.6%. The chi-square analysis of characteristics of the patient and medication adherence showed that there was a significant relationship between side effect (*p-value* 0,025) with medication adherence. There was no significant relationship between medication adherence with gender, age, level of education, occupation, income, duration of disease and number of currently used medicines ( $p>0,05$ ). It can be concluded that the incidence of side effect is a significant predictor of medication adherence for a patient with SLE.

**Keywords:** *Systemic Lupus Erythematosus, adherence, Morisky Green Levine test.*

## INTRODUCTION

Systemic Lupus Erythematosus (SLE) is an autoimmune disease characterized by widespread inflammation and has multiple manifestations. The clinical manifestations of SLE are very extensive including the skin and mucosa, joints, blood, heart, lungs, kidneys, the central nervous system (CNS), immune system, and ear<sup>1</sup>. The exact number of patient with SLE in the world is unknown. The prevalence of SLE varied from 4-250 per 100.000 population<sup>2</sup>.

The treatment of SLE is aimed to obtain a long remission period, reduce the activity of the disease, reduce pain and maintain organ function. The standard medications include glucocorticoids, immunomodulatory drugs, and NSAID (Non-Steroid Antiinflammatory Drugs). Patients with SLE require adherence to long-term treatment to remain in remission<sup>3</sup>.

Adherence to a medication regimen refers to whether a patient takes a prescribed medication according to the provider's instructions<sup>4</sup>. The lack of adherence is the most common problem among patients with chronic diseases. The lack of adherence may lead to increased treatment costs, decreased quality of life, increased complications of illness and risks of hospitalization<sup>5</sup>. The World Health Organization (WHO) has identified the factors affecting adherence were health-care systems, provider relationships, disease, treatment, patient characteristics and socioeconomic characteristics<sup>6</sup>.

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The rate of medication adherence in a patient with SLE has varied from 54% to 93%<sup>7,8</sup>. A previous study in Brazil showed that only 31.7% was adhere to drug treatment<sup>9</sup>.

Factors that may be associated with adherence in patients with SLE including age<sup>11</sup>, level of education, income, duration of disease<sup>13</sup>, number of medicines<sup>10</sup> and side effect<sup>7</sup>.

This study aimed to measure the prevalence of medication adherence and analyze associations between socio-demographic, duration disease, number of currently used medicines and side effects of medication adherence in patients with SLE.

**METHODOLOGY**

This was a descriptive and analytic study of SLE patients during the period from February 2018 to April 2018. The study was approved by the ethics committee of Faculty Medicine of Sebelas Maret University with ethical certificate number: 106 / II / HREC / 2018, and written informed consent was obtained from all participants.

The study population was selected from the Yayasan Tittrasi Griya Kupu Solo. The inclusion criteria were (1) patient diagnosed SLE who are registered as a member of Yayasan Tittari Griya Kupu Solo, (2) in use of at least one specific drug for treatment of SLE, and (3) willing to be a participant in the research by signing the informed consent sheet. The exclusion criteria were patients who did not answer the question completely.

Patients’ information regarding their demographic and socioeconomic characteristics, duration of disease, number of currently used medicines and side effect were collected by using a structured questionnaire. Adherence behavior was assessed by interviews based on the Morisky Green Levine Scale (MGLS) by asking four questions: (1) Do you ever forget to take your medicine?; (2) Are you careless at times about taking your medicine?; (3) When you feel better, do you sometimes stop taking your medicine?; and (4) Sometimes if you feel worse when you take your medicine, do you stop taking it?<sup>19</sup>

Descriptive statistics were used for the demographics and patient characteristics. The categorical data were summarized as numbers and percentages. The Chi-squared test and Fischer’s exact test were used for bivariate analysis to investigate the association between

adherence and the other covariates (gender, age, level of education, occupation, income, duration of disease, number of currently used medicines, and side effect). All data were analyzed using statistic.

**RESULTS**

A total of 41 patients were interviewed between February 2018 – April 2018, most of them were female (95.1%), aged between 26-45 years (61%), high educated (51.2% > 12 years education), the most frequent monthly total family income was >1.500.000 IDR/140 USD (80.5%) with duration of disease was ≤ 5 years (63.4%), and number of currently used medicines was < 5 drugs (73.2%) . Participant’ characteristics are shown in table 1.

The SLE medication taken by patients consist of single medication and combination drug. The single medication and combination drugs are taken by patients were methylprednisolone (34,1%) and methyl prednisolone + mycophenolate mofetil (36.6%). Other SLE drugs included methyl prednisolone + cyclosporine (17.1%), azathioprine (4.9%), mycophenolate mofetil (2.4%), mycophenolate acid (2.4%) and leflunomide (2.4%).

**Table 1: Characteristics of participants**

Variables	n	%
<b>Gender</b>		
Men	2	4.9
Female	39	95.1
<b>Age</b>		
< 15 years	1	2.4
15–44 years	35	85.4
> 44 years	3	12.2
<b>Level of Education</b>		
≤ 12 years	7	17.1
> 12 years	34	82.9
<b>Occupation</b>		
No	23	56.1
Yes	18	43.9
<b>Income</b>		
≤1.500.000IDR/104USD	8	19.5
>1.500.000IDR/104USD	33	80.5
<b>Duration of disease</b>		
≤ 5 years	26	63.4
> 5 years	15	36.6

Conted...

Number of currently used medicines		
< 5 drugs	30	73.2
≥ 5 drugs	11	26.8
Side effect		
No	19	46.3
Yes	22	53.7

Based on the data analysis and using the MGLS, the prevalence of non-adherence was 36.6% in the sample of patients (n=15). The answers to each question in the MGLS were examined individually (Table 2). The fewest patients adequately answered the question regarding taking medicine at the right time (n=15, 36.6%), followed by stopping medicine when feeling worse (n=18, 43.9%) and stopping medicine once asymptomatic (n=18, 43.9%), and forgetting to take medicine (n=25, 60.9%).

**Table 2: The frequency of answer “yes” to question in MGL questionnaire**

Questions	n	%
Do you ever forget to take your medicine?	25	60.9
Are you careless at times about taking your medicine?	15	36.6
When you feel better, do you sometimes stop taking your medicine?	18	43.9
Sometimes if you feel worse when you take your medicine, do you stop taking it?	18	43.9

Adherence to drug treatment was significantly associated ( $p$ -value=0.025) with the side effect. No association between medication adherence and gender ( $p$ -value=1.000), age ( $p$ -value =0.615), level of education ( $p$ -value =0.390), occupation ( $p$ -value =0.550), total family income ( $p$ -value =1.000), duration of disease ( $p$ -value =0.506) and a number of currently used medications ( $p$ -value =1.000) was observed in this study (Table 3).

**Table 3: Associations between covariates variables and prevalence of medication adherence**

Variables	P-value
<b>Gender</b>	
Men	1.000 <sup>a</sup>
Female	

Conted...

<b>Age</b>		
< 15 years	0.615 <sup>a</sup>	
15 – 44 years		
> 44 years		
<b>Level of Education</b>		
≤ 12 years	0.390 <sup>a</sup>	
> 12 years		
<b>Occupation</b>		
No	0.550	
Yes		
<b>Income</b>		
≤ Rp 1.500.000	1.000 <sup>a</sup>	
> Rp 1.500.000		
<b>Duration of disease</b>		
≤ 5 years	0.506	
> 5 years		
<b>Number of currently used medicines</b>		
< 5 drugs	1.000 <sup>a</sup>	
≥ 5 drugs		
<b>Side effect</b>		
No	0.025	
Yes		

**Notes:** <sup>a</sup>Fischer’s exact test.

## DISCUSSIONS

This is the first study about medication adherence in a patient with SLE in Indonesia using MGLS. In this study, we assessed the frequency of medication adherence, as well as; we examined the association between medication adherence and other covariates. Factors that may be associated with adherence in patients with SLE including gender, age, level of education, occupation, total family income, duration of disease and number of currently used medications and side effect.

There is no standard method to measure medication adherence. Medication adherence can be evaluated by direct methods such as biological assay of body fluids, tracer drug compound, and biological markers. There are also indirect methods for evaluating the medication adherence such as self-report, pill counts, rates of prescription refills and questionnaires<sup>18</sup>. The Pill count method is one of the most widely used methods for determining the level of medication adherence, but this method provides no information on other aspects of taking medications. Therefore, there is an alternative method that can be used that is using a self-report questionnaire. Frequently used questionnaire is MGLS.

According to the results obtained 36.6% of respondents are non-adherence to treatment. This is in contrast to the previous study using MMAS-4, indicating that the adherence level in SLE patients was 31.7%<sup>9</sup> whereas according to other study mentioned that the level of adherence in SLE patients ranged from 48-93% depending on the method used<sup>11</sup>. In this study, the main reason for not taking their medicine: forgetting to take medication (93.3%) and feeling good (93.3%), followed by had problems taking pills at specified times (73.3%) and avoiding side effects (73.3%).

In this study examined the relationship between demographic and socioeconomic characteristics, duration of disease, number of currently used medicines and side effects with medication adherence. According to the results of the study, it was found that gender and age were not significantly associated with medication adherence. This finding is similar to other studies suggesting that age and sex were not significantly associated with medication non-adherence<sup>4,10</sup> but other studies have shown that younger age is a factor that significantly affects medication adherence<sup>11</sup>.

The level of education was not associated with medication adherence in the current study. This finding is similar to another study, the level of education was not affected medication adherence<sup>12</sup>. In contrast, other study showed that the level of education was associated with medication adherence. Lupus patient with a higher level of education may be more aware of their disease and treatment option and are capable of making better decisions in drug use because a patient with high level of education might be more likely to research about their disease and medications with great detail<sup>13</sup>.

In the current study, occupation was not associated with medication adherence. Our finding similar to the previous study which mentioned that occupation was not associated with medication adherence<sup>3</sup>. Lupus patients were given up their job because of the difficulty of completing the work with their physical conditions<sup>14</sup>.

In the current study, income was not associated with medication adherence. This result in agreement with the previous study in SLE<sup>9</sup> and contrast with another study, the higher amount of income tends to be more adhere to their medication<sup>13</sup>. Similar to previous studies in SLE patients, duration of disease was not associated with medication adherence<sup>12,15,16</sup>.

Number of currently used medicines was not associated with medication adherence. Our finding similar with the previous study which concluded that the number of currently used medicines was not associated with medication adherence<sup>9</sup> but in contrast with other studies, the number of currently used medicines was associated with medication adherence<sup>8,10</sup>. Many patients with SLE have comorbidities such as hypertension, dyslipidemia, depression, coagulopathies, and osteoporosis, each of which may require one or more drugs for adequate control. This prescription medication burden can result in impact patient adherence<sup>10</sup>.

There was a significant association between medication adherence and side effect. This is in agreement with previous studies that side effect is significant predictor of medication adherence for patient with SLE<sup>7,9,17</sup>. Side effects occurred in a considerable percentage of patients (53.7%). Approximately 73.3% of patients reduced the dose or stopped taking their medication when they noted some side effects. Based on interviews found that the most common side effect is moonface (36.4%) and followed by osteoporosis (22.7%), nausea (18.2%), vomiting (13.6%), gain weight (13.6%), hypertension (4.6%) and cataracts (4.6%). These side effects can not be ascertained because the use of lupus drugs. In this study, there were no specific studies of side effects.

This study has some limitations. First, the study sample was small. Second, the design of this study limits the ability to determine temporal relationships between risk factors and medication adherence.

## CONCLUSIONS

This study found that there were 36.6% of respondents are non-adherence to treatment. Gender, age, education, occupation and income were not associated with medication adherence ( $p > 0.05$ ). The duration of disease and the number of currently used medicines also were not associated with medication adherence ( $p > 0.05$ ). There was a significant correlation between side effects with medication adherence in patient with SLE ( $p = 0.025$ ).

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**Conflict of Interest:** There is no conflict of interest

**Ethical Clearance:** The study was approved by the ethics committee of Faculty Medicine of Sebelas Maret University with ethical certificate number: 106 / II / HREC 2018.

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# Adverse Childhood Experiences and Depression among Indonesian University Students

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## ABSTRACT

The prevalence of mental health problems, including depression, among university students was high. Previous studies showed that adverse childhood experiences was among factors that contribute to the course of depression. Individuals with more adverse childhood experiences had more vulnerability to have depression symptoms in their later life. This study was aimed to describe the adverse childhood experiences and depression among university students and to investigate the role of adverse childhood experiences to depression. Data were collected from 419 students of Diponegoro University. The subjects filled the Adverse Childhood Experiences Questionnaire and Beck Depression Inventory II (BDI-II). Data were analyzed using descriptive and correlation analysis as well as Receiver Operating Curve (ROC) and odds ratio computation. The result showed that subjects had zero to seven adverse childhood experiences and the average score of depression is 13,22 ( $SD=6.998$ ). Using cut-off score at 17, the data showed that the prevalence of depression among subjects was 27.7%. Both variables in the study were significantly correlated (*Spearman's rho* = .266;  $p < .0001$ ), supporting previous studies in general population. The Area Under the Curve (AUC) of adverse childhood experiences as predictor of depression was 61.9%. Odds ratio of individuals with minimum one adverse childhood experience was 2.481 (95% CI; 1.602 – 3.843). The result offers an additional understanding to mental health problems, particularly depression, among university student. Further implication of this findings for mental health program in university is discussed.

**Keywords:** *adverse childhood experiences, depression, mental health problems, university students*

## INTRODUCTION

Mental health problems at the developmental transition from adolescence to adulthood was prevalent. In particular, previous studies showed high prevalence of mood disorders, anxiety disorders, and substance use disorders among adolescents<sup>1,2</sup> and young adults. Depression becomes one among other mental health problems which needs special attention because of its risk to suicide attempt and other health-related problems<sup>3</sup>. College students as individuals experiencing transition from adolescence to adulthood also prone to mental health problems, including depression<sup>4-7</sup>. The depressive symptoms used to be expressed through

social media like facebook<sup>8</sup>. Depression among college students could negatively affect not only health-related condition but also academic development.

Several factors were associated with the course of depression, including adverse childhood experience<sup>9-11</sup>. Adverse childhood experience (ACE) was a commonly used indicator in public health surveillance. It consisted of but not limited to experience of abuse (emotional, physical, sexual); neglect (emotional, physical); witnessing domestic violence, having family members abuse alcohol or drugs or have mental illnesses, parental separation or divorce, or having family members with criminal behaviors<sup>12</sup>. ACE could be an obvious marker to develop early prevention to foster children for having more severe effect in their later life.

Many studies were done regarding association between ACE and depression. It showed that having more adversity experiences during childhood increases the risk of having depressive symptoms<sup>13,14</sup> or depressive

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disorder<sup>9,10</sup> or risky behavior related to depression such as alcohol or drug abuse, smoking, risky sexual behavior, self-injurious behavior, and suicide attempt<sup>13-16</sup> in later developmental stage. Most of those studies involved adult participants. The study on younger samples such as adolescence or younger adult was available but still limited<sup>11,14</sup>, particularly in developing countries setting<sup>15-17</sup>. Considering the importance of passing through developmental transition and succeeding the academic process in college or university, study about the role of ACE to the emergence of depressive symptoms and depressive disorder with college students sample was needed.

This study aimed to describe the ACE and depressive symptoms among university students and examine the risk level of having depression among those experiencing adversities during their childhood. The hypothesis of the study is the more adversities experienced during childhood, the more probability or risk for having depression.

## METHOD

**Subjects and procedures:** The subjects comprised 419 undergraduate students from Diponegoro University, Semarang, Indonesia. The subjects were from four faculties in the university. Prior to data collection, the researchers sent a letter for asking permission to the dean of each faculty to conduct the research. Approval from the dean was then followed by coordination with academic vice dean about which class was able to be involved in the study. Subjects consented to participate in the study filled the questionnaires classically with guidance from researchers' team. Of the sample, the age of the subjects range from 18 to 20. Majority of the sample were female (73%).

**Measures:** Adverse Childhood Experiences Questionnaire was used to measure the type and number of adversities experienced by subjects during their childhood. It consisted of 12 items, asking about childhood adversities during respondent's first 18 years of life. The twelve items were representing childhood adversities, including abuse (emotional, pphysical, and sexual), neglect (emotional and physical), domestic violence, parental separation or divorce, alcohol or substance abuse problems in family, mental health problems in family, incarcerated family members, bullying, and loss of parent(s). The ACEs Questionnaire

was administered in self-report technique and scored by 0 or 1, resulting in total score ranging from 0 to 12. Zero indicating subject was not experiencing the adversity and 1 indicating subject had that kind of adversity experience. The samples of the items were "*Were you bullied?*" and "*Did your parents (father/mother) die?*".

Beck Depression Inventory-II/BDI-II was self-reported questionnaire used to measure depression level of individuals. It consisted of 21 items. The BDI-II was among most frequently used questionnaire to measure depression around the world, both in general and clinical setting. The subject were asked to choose among groups of statements (multiple choice) that best describe their condition for the last two weeks. Each item scored from 0 to 3. The total score were summative score of all items, ranging from 0 to 63 which indicate the level of depression. The BDI-II had been adapted in many language. This study used Bahasa Indonesia version of BDI-II with satisfactory reliability and validity. Cronbach's alpha in this study was .83. The cut-off used in this study was 17 to detect clinical level of depression, as recommended by study in Indonesia. The sample item of BDI-II was "*I am sad all the time*" and "*I feel my future is hopeless and will only get worse*".

## DATA ANALYSIS

The data in this study were analyzed using Statistical Package of Social Science (SPSS) for Windows version 20.0. Descriptive and non-parametric correlational analysis were employed. In addition, t-test, odds ratio and Receiver Operating Curve (ROC) were computed.

## RESULTS AND DISCUSSIONS

The demographic data of the subjects were presented in Table 1. It showed that most of the subjects were female (73%), Javaness ethnic group (76%). The age of the sample ranged from 18 to 20 with mean age 18.61 ( $SD = .607$ ). The GPA ranged from 1.89 to 4 with mean 3.39 ( $SD = .37$ ) for 4 point grade. The number of adversity experienced by subjects ranged from 0 to 7. Most of the subjects claimed to have none of adverse childhood experiences (54.2%), followed by one adverse childhood experiences during the first 18 years of life (30.1%). The score of depression level using BDI-II was ranged from 1 to 39 ( $M = 13.22$ ;  $SD = 6.998$ ). Using cut-off 17, a number of 118 (28.2 %) of the subjects were found to have clinical depression.

A t-test and One-Way ANOVA or Kruskal-Wallis test were conducted to see the differences on variables of interest based on demographic data. The differences based on gender were observed on ACEs score ( $t[416] = -2.959; p = .03$ ), but not in BDI-II score ( $t[416] = -.120; p = .904$ ). Male students had higher average ACE score than female students. Based on ethnicity, there were significant differences in BDI-II score ( $F[2] = 5.116; p = .006$ ), but not in ACEs score ( $\lambda^2[2] = 4.518; p = .104$ ). The multicultural group was found to have highest depression score, followed by non javanese ethnic group, and javanese ethnic group. The differences was observed in ACEs score based on study major ( $\lambda^2[3] = 25.995; p < .0001$ ), but not in BDI-II score ( $\lambda^2[3] = 6.190; p = .103$ ). Non-parametric correlational analysis then employed between variables of interest and age. There was no correlation between both ACEs score and BDI-II score with age (*Spearman's rho* =  $-.007; p = .665$ ; *Spearman's rho* =  $-.021; p = .892$ ). The correlation was also not found between BDI-II score with GPA (*Spearman's rho* =  $-.063; p = .209$ ). But, the correlation was observed between ACEs score and GPA (*Spearman's rho* =  $-.121; p = .015$ ).

Regarding adversity type, the most common adversity experienced by subject was bullying (33.2%), followed by emotional abuse (8.8%), physical abuse (6.9%), and parents passed away (6.9%). The most common depression symptoms observed in the subjects was change in sleep pattern, followed by guilty feelings, self-criticalness, agitation, and change in appetite. The complete descriptive data for adverse childhood experiences and depression were displayed in Table 2 and Table 3.

**Table 1: Demographic data (gender, ethnicity, faculty), ACEs score, and depression score of samples (n = 419)**

Category	f	%	ACEs Mean (SD)	BDI-II Mean (SD)
<b>Gender</b>				
Female	305	73	.67 (1.11)	13.19 (6.97)
Male	113	27	1.04 (1.21)	13,28 (7.12)
Missing data	1			
<b>Ethnicity*</b>				
Javanese	316	76	.72 (1.13)	13.04 (6.83)
Non Javanese	87	20.9	.78 (1.07)	13.06 (7.09)
Bicultural or multicultural	13	3.1	1.54 (1.56)	19.31 (8.75)
Missing data	3			

Conted...

Study major				
Psychology	93	22,2	1.38 (1.56)	15.29 (8.43)
Engineering	59	14,1	.56 (.95)	12.75 (6.49)
Sains and mathematics	157	37,5	.64 (.99)	12.57 (6.43)
Public health	110	26,3	.53 (.82)	12.65 (6.44)

\*Ethnic group were divided into three categories to simplicize the data. Non javanese ethnic group consists of many ethnic groups other than Javanese and was computed together because of the small number of each.

The non-parametric correlational analysis using Spearman rho test was employed to examine the relation between ACE and depression. The result showed that there was positive correlation between adverse childhood experiences and depression (*Spearman's rho* =  $.266; p < .001$ ). Therefore, the more adversity experiences by subjects during their childhood, the more depression level was observed among subjects. In terms of sesitivity and specificity, the ROC analysis showed that measurement of ACEs had Area Under Curve (AUC) of  $.626$  (95% CI;  $.566 - .687$ ), meaning that 62.6% prediction using ACE score was correct. The recommended cut-off point was  $.5$  (or rounded to 1). Using the recommended cut-off points, ACEs questionnaire could predict correctly 61.9% of subject with clinical depression as having depression (sensitivity level) and 39.5 % of subjects without clinical depression as having normal depression level (spesificity level). Odds ratio of individual with at least one adverse childhood experience to have depression in their early adulthood was 2.481 (95% CI; 1.602 – 3.843). It could be interpreted that individual with adversity experience during their childhood, even only one, would have 2.5 times risk higher than others to have depression in their later life.

**Table 2: Prevalence of adverse childhood experiences' types among samples (n = 419)**

ACE	f	%
Emotional abuse	37	8.8
Physical abuse	29	6.9
Sexual abuse	9	2.1
Emotional neglect	24	5.7
Physical neglect	6	1.4
Living in family with parents separated or divorced	12	2.9

Conted...

Living in family with domestic violence	7	1.7
Living with family member with alcohol or substance abuse problem	5	1.2
Living with family member with mental health problems	13	3.1
Having incarcerated family member	10	2.4
Bullying	139	33.2
Parent(s) passed away	29	6.9

**Table 3: Prevalence of depressive symptoms among samples (n = 419)**

Items	Score 0	Score 1-2-3
Sadness	196 (46.8%)	223 (53.2%)
Pessimism	293 (69.9%)	126 (30.1%)
Past failure	251 (59.9%)	169 (40.1%)
Loss of pleasure	230 (54.9%)	189 (45.1%)
Guilty feelings	60 (14.3%)	359 (85.7%)
Punishment feelings	250 (59.7%)	169 (40.3%)
Self-dislike	262 (62.5%)	157 (37.5%)
Self-criticalness	124 (29.6%)	295 (70.4%)
Suicidal thoughts or wishes	385 (91.9%)	34 (8.1%)
Crying	295 (70.4%)	124 (29.6%)
Agitation	129 (30.8%)	290 (69.2%)
Loss of interest	239 (57%)	180 (43%)
Indecisiveness	213 (50.8%)	206 (49.2%)
Worthlessness	325 (77.6%)	94 (22.4%)
Loss of energy	170 (40.6%)	249 (59.4%)
Changes in sleep pattern	39 (9.3%)	380 (90.7%)
Irritability	229 (54.7%)	190 (45.3%)
Changes in appetite	131 (31.3%)	288 (68.7%)
Concentration difficulty	182 (43.4%)	237 (56.6%)
Tiredness or fatigue	137 (32.7%)	282 (67.3%)
Loss of interest in sex	351 (83.8%)	68 (16.2%)

**Note:** Five most common symptoms were displayed in bold

The results of this study supported previous study both in developed and developing country settings that ACE became a risk factor for mental health problems during adolescence and early adulthood<sup>10-15,17</sup>. When individual with history of ACE was experiencing chronic stress during adolescence, there would be

higher response on hipotalamus pituitary adrenal (HPA), resulting more elevated and prolonged cortisol<sup>3</sup>. This enhanced HPA activity become one factor of the emergence of depression among uniersity students.

The most common childhood adversities experienced by subjects in this study was bullying. It supported previous study about the high prevalence of bullying at school<sup>18</sup>, and showed the dangerous effect of it. Bullying, especially during childhood and early adolescence was like a crisis situation for children because peer acceptance was very essensial for them. The second common childhood adversities found in this study was emotional abuse. The example of emotional abuse was insult, humiliation, and action in the way which put children down or make children afraid of physically hurt. Those kinds of behavior were often observed among parents. They might not aware of the effect of their behaviors. Children experiencing emotional abuse had their trust to the very closed person in their life broken. With their basic trust broken, it would be more difficult to trust another people, resulting in difficulty to relate with other. Children experiencing emotional abuse would also had low self-esteem and easy to blame themselves for failure.

In line with the findings about ACE, the most common depressive symptoms found in this study were chenge in sleep pattern, guilty feelings, self-criticalness, agitation, and change in appetite. The first common symptom was about sleep disturbance, representing somatic symptoms. This symptom indicated that subjects was very tense and stressed. The disturbace in sleeping patter could expressed in hypersomnia or insomnia. Both of them were indicators of tension and stress. This findings was similar to study among US young adults which showed 57% prevalence of sleep disturbance<sup>19</sup>. The later depressive symptoms were highly associated with low self-esteem. Individuals with low self-esteem were very easy to feel guilty eventhough they were not guilty. The guilty feeling was usually accompanied by self-critical, such as doing overevaluation to themselves all the time. This overevaluation also made individuals agitated. Change in appetite as another somatic symptom could also appear when individuals in tese and stress.

The prevalence of clinical depression among university students in this study was 28.2%. The depression level did not differ across gender or study major, but differed by ethnicity. The students with



multicultural ethnic and non javanese ethnic were shown to have higher licel of depression. This could be because they need cultural adaptation when study in Central Java with javanese ethnicity as majority. This finding was different from previous study that usually found gender differences on depression.

The difference based on gender was observed in ACE score with higher score on male. It was also different with previous study that usually showed female as more vulnarable to have childhood adversity because of gender inequality. Further study was needed to explore this finding.

The main result in this study was about the correlation between ACE and depression the odds ratio based on the recommended cut-off from ROC analysis. The odds ratio found in this study was similar to the study among adults<sup>9</sup>. The positive correlation found between both variables was supported by previous study that ACE was a risk factor of depression. The more childhood adversities experienced by individuals, the more depression level individuals would have. This finding confirmed that the risk was exist even since adolescence.

The higher risk of having depression among university students with at least one ACE implies the need for all kinds of intervention, including preventive, curative, and rehabilitative. The preventive action was compulsory in childhood stage. Effective programs need to be implemented to prevent more children experiencing adversities and prevent more adversities experienced by children<sup>12</sup>. The curative and rehabilitative programs could be done by university through counseling and mental health promotion programs<sup>20</sup>.

Despite the important findings in this study, it has several limitations. First, this study used convenient sampling with representation from several faculties or study majors. Further study could use random or systematic sampling to get more representative prevalence and odds ratio. Second, this study was a cross-sectional study with ACE measured retrospectively. Although retrospective method was recommended fo population-based study<sup>12</sup>, there was a risk of bias based on the dispositional condition of the subjects<sup>21</sup>. Prospective method to measure ACE could be used to get a more objective result. Third, further study could expand the investigation by involving more variable, including predictor variables and outcome variables.

## CONCLUSIONS

The ACE and depression were common among university student. Having at least one adverse childhood experience could increase the risk of having depression to 2.48 times. With this risk, students would need more support and guidance in dealing with both academic and con academic stressors during their study in university.

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# Maternal Care among Madurese through the Form of Culture

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## ABSTRACT

To overcome the maternal's health problem, preventive action based on the culture's perspective was chosen compared to the medical's perspective. Madurese still believe in the myth about food and action which affect their pregnancy. Based on the theory of A.L Kroeber, there is 3 form of culture to identify a community's culture. This study aim is to identify maternal care among Madurese through the form of cultural: 1) ideas; 2) activities and 3) artefact. This study was a descriptive research with the qualitative approach. This study conducted in the area of Puskesmas Trageh (Bangkalan) and Puskesmas Omben (Sampang) in Madura. The total main informant was 18 persons that consist of 3 pregnant women for each area and the key informants consist of 1 midwife coordinator, 1 local midwife, 1 shaman and 1 family member of each pregnant women. The maternal care towards the form of cultural ideas: 1) They should have a good intention towards other people; 2) increase their worships through reading Holy Qur'an; 3) avoid the distraction of the spirits by pray and use a talisman. The maternal care towards the form of cultural activities: 1) have a celebration to show the gratitude feeling towards God; 2) drink herbal medicine and do massage at stomach by the shaman; 3) avoid several foods based on myth. The maternal care towards the form of the cultural artefact uses the talisman to avoid misfortune. It showed phenomena that Madurese still do traditional maternal care which often contradictory to the modern medicine.

**Keywords:** Maternal care, Madurese, Three form of culture, Culture's perspective

## INTRODUCTION

Based on a research by Devy (2013), the cause factors of maternal health problems are including maternal health knowledge, poverty and culture<sup>1</sup>. Meanwhile, a factor that is often overlooked is the culture of society. Discussing culture means also relating to values, beliefs, behaviours, myths and even something magical / mystical and contrary to modern medical science. Society does not prioritise preventive efforts that fit the medical view, such as routine check pregnancy and eat nutritious food. However, the preventive efforts undertaken are more inclined to the cultural view, which is to eat taboos to eat certain foods and behaviours. However, these behaviours often endanger the health of pregnant women.

Identifying the culture of society can be done by referring to the three cultural manifestations of A.L.Kroeber. Three-forms of culture are: 1.) Form of ideas, 2.) Form of activity, 3.) Form of artefact<sup>2</sup>. The statement is in accordance with Malinowski's opinion in Ihromi (1981), on the view of functionalism towards culture, stating that every pattern of habitual behaviour, every belief and attitude that is part of the culture in a society, fulfils some fundamental functions in the culture concerned<sup>3</sup>. Based on the explanations that have been described, it is necessary to do mapping on maternal care on Madurese culture. This study refers to Dunn's theory, which states that behaviour is formed through 3 factors: culture, social and psychology<sup>4</sup>. In this study focused on cultural factors only. The results of this study are expected to be baseline for special health promotion activities in the field of MCH, and indirectly contribute to the quality of health education materials for pregnant women. The aim of this study is to identify and develop the mapping of maternal care in Madurese culture using the three form of culture.

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## METHOD

This study used descriptive research design with qualitative approach. The study conducted in area of Bangkalan District (Puskesmas Trageh) and Sampang District (Puskesmas Omben) in Madura Island. The duration of this study was 4 months (August-November 2016). Informant that included in this study were pregnant women who already selected based on inclusion criteria. The inclusion criteria for the informant who were 1) willing to be a research subject; 2) originally from Madura Island; and 3) local people who live at the location of the study.

The total number of informants for each area was 3 pregnant women. While, the key informants for each district was consisted of a midwife coordinator, a midwife district, a shaman and a family member of each pregnant women. In-depth interview and observation were using for collecting the data from the informants. Traditional maternal care is defined as health-related activities conducted traditionally during pregnancy in Madurese society, covering 3 forms of culture that is Ideas (values, norms, beliefs), Activities (activities performed during pregnancy) and Artefacts (health-related equipment used during pregnancy). To obtain valid data in this study, credibility of data or info was obtained with doing data triangulation, conducting member check and doing observational persistence in informants.

## RESULTS AND DISCUSSIONS

### Mapping of Maternal Care in Bangkalan District:

Maternal care is an activity that plays an important role for the health of mother and baby. Based on the research data, obtained information that the utilisation of maternal health services is good. Based on the results of in-depth interviews with the midwife coordinator and the village midwife, the following quotation excerpt:

*“Health services in pregnant women already in maximum level, for example: go to the pregnant women’s house. Integrated antenatal care has been done routinely through pregnant women’s classes (i.e 6 months once in 2016). The classes directly conducted in some villages “(Midwife Coordinator, Z).*

*“... pregnant women want to receive prenatal care & want to go to Polindes (Village Maternity Hut)“ (Local Midwife, Ch).*

The average number of antenatal care visit is 4 times during the pregnancy. In general, pregnancy tests performed by pregnant women in modern and traditional way. At the beginning of feeling their pregnancy, the mothers check to ensure her pregnancy to midwife. Having tested positive pregnant, on the advice of the family, the mothers choose treatment to the shaman for the massage. After 4 to 5 months of pregnancy, pregnant women come to the midwife to check their pregnancy. As stated by the local midwife in the following interview:

*“When they know about their pregnancy, they directly checked to a shaman. If their pregnancy getting bigger, they check their pregnancy to midwife. Antenatal care is not purely do by pregnant women because they just do it from 2nd trimester, like check to Midwife. There are elements of taboo at the age of 1 to 9 months that the baby will be eaten by “dhilep” (ghost), so that in 5 months of pregnancy, the new pregnant mother conduct examination to midwife” (Local Midwife, Ch)*

*“If the shaman usually massaged her stomach, the benefits is the baby position will downward. So many are troubled because it is even massage upheld by the shaman so that pregnant women are not in pain. ...the reason why pregnant women go to the shaman because of her family (mother-in-law, mother and grandmother) who asks to go to the shaman to be massage upheld” (Local midwife, Ch)*

From the interviews, it was found that there is several activities related to the three form of culture that was did by pregnant women and her husband during the pregnancy to avoid misfortune. Pregnant women and her husband believed that the activities have some benefits for her and her baby, the collection of activity could be seen in the Table 1. The maternal care activities in the 1st trimester is still negative because there are still many myths trusted even though there is no scientific proof. The maternal care in the 2nd trimester still not involving health worker. The activity of maternal care in trimester 3 there is still myth trusted by society even though there is no scientific proof about it.

**Table 1: The Maternal Care based on the three form of culture in Bangkalan District**

Trimester	Pregnancy Care Activity	Benefits
1 <sup>st</sup> Trimester	<b>The Form of Ideas:</b>	
	Pregnant women have dietary restriction	To avoid the baby condition is not the same as the food's properties
	Must recite Holy Qur'an, especially Surah Maryam and Yusuf after prayer	The baby becomes handsome and beautiful
	<b>The Form of Activities:</b>	
	Drink the herbal drink and young coconut water	The baby will have fair skin
	<b>The Form of Artefact:</b>	
	Use talisman in her stomach	To avoid the distraction of bad spirit's power
2 <sup>nd</sup> Trimester	<b>The Form of Ideas:</b>	
	Eating eggs should be divided into two	To avoid baby born with conjoined twin's condition
	<b>The Form of Activities:</b>	
	The pregnant women regularly doing massage by the shaman	To fix the baby's position
	<b>The Form of Artefact:</b>	
	Have a celebration ( <i>selamatan</i> ) in the 4 <sup>th</sup> month of pregnancy and giving food to the God with white and red porridge	Doing celebration because the spirit of the baby recently enters the its body
3 <sup>rd</sup> Trimester	<b>The Form of Ideas:</b>	
	Should not drink much ice and should not eat high fat food, for example: beef, bone marrow, instant noodle and meatballs	To avoid the baby condition is not the same as the food's properties and become bigger
	<b>The Form of Activities:</b>	
	The pregnant women regularly doing massage by the shaman	To fix the baby's position
	<b>The Form of Artefact:</b>	
	Use talisman in her stomach	To avoid the distraction of bad spirit's power

**Mapping of Maternal Care in Sampang District:**

Based on the result of in-depth interview and observation with the informants in Puskesmas Omben, the utilisation of maternal health services is quite good in that area. The midwife said that the coverage of maternal health service is already good through Posyandu that hold every month in the 2nd week. The average number of visits for antenatal care is more than 4 times during the pregnancy. While the problem is the first visit (K1) among pregnant women is still mixed between visiting shaman and also the midwife. The local midwife called that this condition as the impurity of maternal care. There are several reasons underlying this impurity, such as living wandering, unaware of being pregnant, underestimating pregnancy examination in the first trimester, and being ashamed of having too many children. The following

statement was obtained from in-depth interviews with the midwife coordinator and the local midwife, here is the quotation excerpt:

*"The pregnant women do the antenatal care regularly; the majority is more than 4 times. A small number do the pure K1, the majority is impurity K1 ...."* (Midwife Coordinator, Hf)

*"K1 is not pure because of living wandering, unconscious pregnant (the reason is using birth control), underestimate during the first trimester because they considered that it is still early stage of pregnancy, shy, too much child ..."* (Local Midwife, Ard)

Results of interviews with local midwife, midwife coordinator and shaman as the subject, showed there

are still pregnant women who are undergoing maternal care and giving birth in shaman. Society believes that pregnant women who are giving birth with the help of health worker is considered have difficulty of doing birth. Maternal care which provided by the shaman is include massage and herbal medicine. There are the quotes of interview.

“There is still a small number who gave birth in the shaman ...” (Midwife Coordinator, Hf)

“... The perception towards health worker is negative” (Local Midwife, Ard)

“Massage and herbal medicine are still done” (Midwife Coordinator, Hf)

“Herbal medicine is given for healthy babies. Massage for position repair ...” (Local Midwife, Ard)

“Massage, treatment of pregnant women at the age of 7-9 months ... they pay as they want” (Shaman, R)

Pregnant women and her husband believed that the activities have some benefits for her and her baby, the collection of activity could be seen in the Table 2. In the 1st trimester, maternal care activities are more on traditional treatments. In the 2nd trimester, maternal care activities based on the local traditions or cultures. In the 3rd trimester, maternal care activities are still based on the myth that does not have a certain truth, and there are still elements of culture derived from the ancestors.

**Table 2: The Maternal Care based on the three form of culture in Sampang District**

Trimester	Pregnancy Care Activity	Benefits
1 <sup>st</sup> Trimester	<b>The Form of Ideas:</b> Should not eat pineapple, fermented cassava ( <i>tape</i> ) and squid	To avoid the miscarriage and difficulties during baby's birth
	<b>The Form of Activities:</b> Should not chewing eggs and oil (swallowed directly)	To avoid the miscarriage
2 <sup>nd</sup> Trimester	<b>The Form of Ideas:</b> wear clothes should not be wrapped	so that the child is not wrapped around the umbilical cord
	<b>The Form of Activities:</b> The pregnant women regularly doing massage by the shaman	To fix the baby's position
3 <sup>rd</sup> Trimester	<b>The Form of Ideas:</b> wear clothes should not be wrapped	so that the child is not wrapped around the umbilical cord
	<b>The Form of Activities:</b> Wear straps which wrapped around the belly	To avoid the distraction of bad spirit's power during baby's birth
	<b>The Form of Artefact:</b> Should not wearing a talisman	

**Pregnancy Care On Madurese Culture:** The utilisation of maternal health services is quite good among Madurese in both districts. The remained problem is the impurity of first visit (K1) among pregnant women. They still do their K1 in shaman, not in midwife. The average number of visits for doing the antenatal care is more than four times during the pregnancy, around 8-9 times. In general, pregnant women perform their maternal care in a medical and traditional way.

According to the pregnant women and her family's perception, midwives and shamans have different

abilities and mutual support. The shaman has the ability to know and organise the baby's position. While midwives have the ability to know the health conditions of pregnant women, for example: giving injection, measure the blood pressure level, check the baby's heartbeat and giving vitamins. In fact, pregnancy care performed by pregnant women is still dominated by traditional treatments. Because pregnant women have no authority in that regard. Authority is on the mother figure or mother-in-law. She decides all matters related to pregnancy care and determines birth attendants. The traditional treatment aims to maintain the health and

safety of mother and baby in the womb. However, it is often contrary to modern medical provisions.

**Concept of Society's View of Traditional Knowledge as a Culture of Maternal Care:** Overall traditional knowledge is said to be "traditional" because this knowledge is created in a way that reflects the traditions of its people with the culture that exists in their neighborhoods. More explicitly, Correa (2001) concludes that Traditional Knowledge is a collection of various information and functions, developed in the past, but adaptable and subject to contemporary development<sup>5</sup>. Traditional Knowledge is disclosed in documented and undocumented forms and it can have commercial value depending on its potential and real use. So it can be said that the traditional knowledge that exists in the community will be influenced by local culture or customs. The cultural value system is made up of conceptions that live in the minds of most citizens, about the things they have to value in life<sup>6</sup>.

Similarly, the types of traditional medicine in the process of maternal care in Madurese culture, most pregnant women are very obedient to what their mother-in-law instructs because they are afraid to happen anything with their womb and fear of blame, so they prefer to do pregnancy treatment traditional, such as doing massage and taking herbal medicine to care for their pregnancy to a midwife instead of having their pregnancy checked into the village midwife. It happens because of low mother-in-law education and paradigm that still believe in the myth or beliefs that exist in the community. This is in line with the results of Devy's (2013) study, stating that some of the other reasons why pregnant women do not deliver to a health worker are because the cost of delivery to a health worker is considered expensive, the family interfering in decision making, fear of surgery and medication, health knowledge of pregnant women<sup>7</sup>. In addition, there are various taboos and suggestions that must be done by a pregnant woman, like the myth that developed in the community. While the results of surveys conducted by health workers such as midwives and nurses show, doing the massage as maternal care by the shaman will lead to swelling, and the habit of doing scratching the back (*kerokan*) can damage the skin and blood vessels. So the high infant mortality rate in Indonesia can also be caused by the illegal practice of shaman.

## CONCLUSIONS

Maternal care in Madurese culture refers to three-forms of culture, it showed phenomena that Madurese still do traditional maternal care which often contradictory to the modern medicine, especially drinking herbs, activity and dietary restrictions. Mapping of maternal care in Madurese culture refers to three cultural forms, as the description of the phenomenon is sourced from 2 districts on the island of Madura. The development of pregnant class material specially concerning about the effect of drinking herbs and food taboos that refer to the dietary restriction contrary to medical rules is important. Using religious forums in the community (*pengajian*) as a medium to explain the inappropriate public perception of maternal care is the best approaching method.

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# Implementation of Premenstrual Gymnastics on Intensity of Pain dan Level of Anxiety

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## ABSTRACT

**Background:** Premenstrual syndromes (PMS) is a group of symptoms and signs related to the physical and psychological changes happen before women is getting period. PMS reffers to less of economic productivity, lazyness, and lack of activity daily living. The aim of this study is to identify the implementation of the premenstrual gymnastics related to intensity of pain and level of anxiety for young teenagers, late teenagers, and adult women.

**Method:** This study was a quasi-experimental with pre-test post-test controlled group design. The sample consist of 360 women, with 235 as an intervention and 125 women as control group. The group were devided into young teenagers, late teenagers, and young adult women. The level of pain and anxiety were taken before and after the premenstrual gymnastics. This was done 30 minutes for 5 days at 6 to 10 days before getting period. The Data was analised by an independent t test.

**Results:** The prevalence of premenstrual syndrome is 80.6%. The time of menarche is getting early a year in the last two decades. Consuming herbal medicine is the most choices for overcoming PMS. Most subjects have a PMS history from their mother. The mean of pain intensity and anxiety level at pretest of three intervention groups are higher than of thats at three control groups. Premenstrual gymnastics decreases the intensity of pain and the level of anxiety. There are relationships between premenstrual gymnastics with intensity of pain and level of anxiety with p value at 0.001 and p 0.001 respectively.

**Conclusion:** Premenstrual gymnastics might be applied on young teenagers, late teenagers, and young adult women in order to reduce premenstrual syndrome.

**Keywords:** *Premenstrual syndromes, gymnastics, pain, anxiety*

## INTRODUCTION

Premenstrual syndrome (PMS) is a set of symptoms of psychological changes, physical and the behavior occurs 7 to 10 days before menstruation in women of reproductive age.<sup>(1,2)</sup> The incidence of PMS vary widely. The prevalence of PMS from mild to moderate is more than 75%.<sup>(3,4)</sup> As many as 30-60% of young women in Iran who have PMS getting interference significant

daily activities.<sup>(5)</sup> According to the American College of Obstetrics and Obstetricians (ACOG) at least 80% of American women of reproductive age experienced at least one or more symptoms of PMS.<sup>(6)</sup> PMS beginning at age 14 years or 2 years post-menarche. PMS can be persistent until menopause or the age of 50 years or similar with a 480 menstrual cycle. PMS happen most severe in decades of age late 20's and early 30's. <sup>(7)</sup> PMS usually starts in adolescence to menopause. PMS contributes to the rise in cases of postpartum depression. The exact cause of premenstrual syndrome until now uncertain. According to Taylor, 2005<sup>(8)</sup>, there were several factors that cause PMS, which is related to biological and hormonal changes. Highest percentage of interference they are experiencing is a decrease in mood, irritability, anxiety, emotional instability, and lazy to do physical activity.

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PMS usually happens during the luteal phase and disappears after the first day of menstrual blood out. The intensity of the disorder vary between individuals from one another, including in each menstrual cycle.<sup>(9)</sup> The diagnosis of PMS is enforced through the stages of the assessment process, which includes a complete history of the health status relevant to the physical examination, to rule out the existence of psychiatric symptoms which can be identified from prospective rating PMS questionnaire, and check the pattern and severity.<sup>(10,11)</sup> Diagnosis of PMS might be screened in several ways. The diagnosis of PMS can be measured through indicators issued by WHO in 1996, the American College of Obstetricians and Gynecologists (ACOG), the American Psychiatric Association, the DSM-IV in 2000, or the US National Institute of Mental Health (NIMH). DSM IV is the most often questionnaire used to diagnose PMS.<sup>(2,11)</sup>

Effects and symptoms of PMS vary and could be individually. Tamaki Matsumoto in 2013<sup>(12)</sup> mentions the existence of mood disorders and behaviors which include irritability, anxiety, tension, mood instability, prone to tears, expressions of anger, depression or felling blue, lost of controll, difficulty of concentration, confusion, forgetfulness, social isolation or withdrawal. Physical symptoms such as bloating, mammary tension, fatigue, headache, swollen extremities, muscle and joint pain, acne, increased appetite, weight gain, hypersomnia or insomnia.<sup>(13,7)</sup>

The effects of PMS attack occurred during the productive majority. Where their activity is to learn and work. Research in Southern California by Dean 2006 involving women aged 18 to 45 years reported cases of PMS significantly associated with increased rates of absenteeism and daily learning activity. This effect on the decline in labor productivity, the quality of education, and household activities. The results of the economic analysis in the United States was given a diagnosis of PMS significantly associated with an increase of government funding per year for direct medical costs which include outpatient, laboratory tests, and radiology. In addition, there was an increase of United State on an indirect costs associated with decreased productivity and working hours flown, the value equivalent to 3-16% of labor productivity<sup>(14)</sup>.

Handling PMS were done through pharmacology, psychology, diet modification, exercise, or herbal remedies. However, very few studies related to the

effectiveness of such treatment. Moreover, another handling of non-pharmacological were done by modifying behavior.<sup>(15)</sup> Some studies mention that dietary modification and supplementation of food, relaxation, and sports programs might be one choice to reduce PMS. Dietary modification includes control cofein intake, alcohol, salt, carbohydrates, and non of refined sugar have a positive effect.<sup>(16,17)</sup> Relaxation exercises and exercise is also beneficial in cases of PMS, but still very little research on this. Study conducted by Sabaei stated that physical activity might decrease the symptoms of PMS. It is a crucial research and newly scientific evidence related to sports and exercise on PMS.<sup>(4)</sup>

Research by Sri Sumarni, 2015<sup>(18)</sup> found that exercise increased the levels of hormon beta endorphins from an average 197.02 before exercise to 234, 28 after the exercise in the intervention group. Premenstrual gymnastics reduced intensity f pain from the average 5.84 to 1.58 before gymnastics activity in intervention group. There was a significantly differences in the levels of beta Endorphins hormone between the intervention and control group with p value 0.003. There is a significant difference on the intensity of pain between the intervention and control group with p value 0.001.

The purpose of this study was to identify the implementation of the premenstrual gymnastics related to intensity of pain and level of anxiety for young teenagers, late teenagers, and young adult women.

## METHOD

This study was a quasy experimental study with non-randomized pretest-posttest control group, design which do not randomization in the sample and there is a control group.<sup>(19,20)</sup> Subjects as an intervention was given a premenstrual gymnastics series performed for 30 minutes per day for 5 days before the menstrual period. Treatment group was measured at the beginning and end of the intervention. The treatment group and the control group consisted of three groups. The early teenager group was similar to Junior High School students. The second group was late teenagers same as Senior High School students. The third group was young adults women similar to college students.

Subjects were all women who experienced premenstrual syndrome. The subjects were screened by DSM IV questionnaires from the last 3 months menstrual

period. They weren't have any reproductive disorders such as endometriosis and cystic abnormalities through interview. Early teenagers interested in this study as many as 186 people, who suffered of PMS 165 (89%), dropped out was 32 people (19.3%). Subjects who completed the study were 133 people. These divided into 90 as treatment and 43 as a control.

The late teenagers who were interested in this research were 194 peopl. They were 156 people (80.4%) who experienced premenstrual syndrome. There were 12 people (7.6%) who dropped out. They were 144 people, which consisted of 89 as a treatment and 55 as a control.

The young adult women were 168 people, who experienced premenstrual syndrome was 121 people (72.0%), dropped out was 25 people (26%). Young adult women who finished the study were 95 people (56 and 39 as treatment and as the control group respectively).

The independent variable is premenstrual gymnastics and the dependent variable were the intensity of pain and level of anxiety. The tools using in this study were DSM IV questionnaires (2), age of the subject, age of menarche, history of PMS from the biological mother, physical daily activity, habits for overcoming PMS, numeric rating scale (NRS), and the Hamilton Anxiety Rating Scale.

Subjects were given an explanation about this study before taking informed consent. Pre-test was done in the beginning of the study for those groups (intervention and control groups). Intervention in the form of premenstrual gymnastics for 30 to 45 minutes has performed for 5 times in the treatment group. The gymnastics was organized by an expert as gymnastics instructor. Post-test which

measured intensity of pain and level of anxiety was taken after premenstrual gymnastics was performed in the last day of luteal phase. The institutions participating in this study is the Junior High School, Senior High School, and university at Semarang, District of Kendal, and District of Jepara at Central Java Province, Indonesia.

**RESULTS**

The data collected during four months from August until November 2016. Data collection was conducted by researchers, enumerators, and gymnastics instructors. The result of the study in details are presented in the table below.

**Table 1: Characteristic of subjects based on the age of menarche**

Group		The age of menarche		
		Mean	Min	Max
Young Teenagers	Treatment	11.34	9	14
	Control	11.95	10	14
Late Teenagers	Treatment	12:41	10	16
	Control	12.62	10	15
Young adults women	Treatment	13:04	10	18
	Control	12.91	11	16

From the table above it was known that the minimum age of menarche for all respondents 9 years and the maximum age of menarche was 18 years old. The average age of menarche approximately was at the age of 12 years in all age groups. The age of menarche of young teenagers was at 11 years old. Moreover, the age of menarche for the late teenagers and young adults were 12 and 13 years respectively.

**Table 2: Characteristic of respondents based on the habits in overcoming premenstrual syndrome**

Habits to cease PMS	Early teenagers		Late Teenagers		Young adult Women	
	Treatment	Control	Treatment	Control	Treatment	Control
Herbal Remedies	34 (37.7)	4 (9.3)	40 (44.4)	12 (21.8)	12 (21.4)	9 ( 23.0)
Sleeping	14 (15.5)	9 ((20.9)	8 (8.9)	8 (14.8)	7 (12.5)	4 (10.2)
Watching TV	2 (2.2)	1 (2.3)	3 (3.3)	1 (1.8)	4 (7.1)	2 (5.1)
Warm Compress	2 (2.2)	1 (2.3)	2 (2.2)	6 (10.9)	2 (3.5)	3 (7.6)
Medicine	4 (4.4)	2 (4.6)	12 (13.4)	2 (3.6)	10 (17.8)	4 (10.2)
Sports	3 (3.3)	2 (4.6)	4 (4.4)	5 (9.1)	10 (17.8)	5 (12.8)
Relaxation	15 16.0)	10 (23.2)	14 (15.7)	12 (21.8)	11 (19.6)	12 (30.7)
Others	16 (17.7)	14 (32.5)	6 (6.7)	9 (16.4)	0	0
n	90	43	89	55	56	39

The table above shows that the fewest percentage of subjects who treating PMS was watching television and using Water Warm Zack on stomach. Consuming analgesic or Aspirin was the most consuming medicine for reducing pain during PMS. All of young adult

women reported that they took an action for overcoming the symptoms of premenstrual syndrome, no one do “not do anything”. It could be said that young adult women were more aware about their selves.

**Table 3: Characteristic of subjects based on the mother’s history of premenstrual syndrome**

Variabel	Mother’s history of premenstrual syndrome			
	Yes	No	Not know	n
Groups	n (%)	n (%)	n (%)	
<b>Early Teenagers</b>				
Treatment	27 (30)	18 (20)	45 (50)	90
Control	17 (39.5)	4 (9.3)	22 (51.1)	43
<b>Late Teenagers</b>				
Treatment	15 (16.8)	12 (13.4)	62 (69.6)	89
Control	19 (34.5)	10 (18.2)	26 (47.3)	55
<b>Young Adult Women</b>				
Treatment	21 (37.5)	17 (30.3)	18 (32.1)	56
Control	12 (30.7)	10 (25.6)	17 (43.5)	39

The table shows that the high cases of premenstrual syndrome might be contributed to the history of it with their mother. In addition, the early teenagers and late teenagers do not aware the history of their mother. It was showed by the highest percentage of the number “do not know the history of PMS of their mother”. However, the young adult women were the highest group who know the history of their biological mother about PMS.

**Table 4: Distribution of subjects based on the intensity of pain during premenstrual syndrome**

Variable	Mean of Pain Intensity		Difference of mean
	Pre-test	Pot test	
<b>Early teenagers</b>			
Treatment	5.23	2.38	2.85
Control	3.13	2.87	0.26
<b>Late teenagers</b>			
Treatment	5.92	3:59	2:33
Control	4.87	4.64	0:23
<b>Young adult women</b>			
Treatment	5.33	0.95	4.38
Control	4.54	5.13	0.59

The table above shows that most groups decreased level of pain. On the other hand, the control group of young adult women increased the level of pain intensity. The highest decreasing of pain intensity was at group of young adult woman which was at 4.38 point. This was from 5.33 at pre-test to 0.95 at post-test. However, young adult women groups in the control group experienced improvement in pain intensity at 0.59 point, from 4.54 to 5.13.

**Table 5: Distribution of subjects based on the level of anxiety during premenstrual syndrome**

Variable	Mean Anxiety		Difference of mean
	Pre-test	Post-test	
<b>Early teenagers</b>			
Treatment	16.6	14.74	1.86
Control	15.4	15.59	-0.19
<b>Late teenagers</b>			
Treatment	18.59	11.92	6.67
Control	14.97	13.97	1.00
<b>Young Adult Women</b>			
Treatment	14.23	7.05	7.18
Control	13.28	12.92	0.36

It showed that in all group at treatment and control groups decreased the level of anxiety. However, it is an exception that control group of early teenagers increased the level of anxiety at 0.19 point. The highest point of decreasing anxiety was in treatment group of young adult women at 7.18. It was from 14.34 to 7.05.

**Table 6: The effect of premenstrual gymnastics toward intensity of pain**

Variable	Mean	SD	95% CI	P value
<b>Early teenagers</b>				
Treatment	2.35	2.00	1.93 - 2.77	0.001
Control	0.27	1.38	-0.14 - 0.70	0.194
<b>Late teenagers</b>				
Treatment	-1.92	1.83	1.53- 1.15	0.001
Control	0.29	0.89	0.04 - 0.53	0.100
<b>Young Adult women</b>				
Treatment	4.50	3.15	3.65 – 5.34	0.001
Controls	0.59	1.69	1.14 - 0.04	0.360

Table above shows that there was a significant influence of premenstrual gymnastics against intensity of pain in all treatment groups. There were same p values at 0.001. There do not influence in intensity of pain as evidenced by the p value more than 0.05 in all control groups.

**Table 7: Effect of premenstrual gymnastics toward the level of anxiety**

Variable	Mean	SD	95% CI	P value
<b>Early teenagers</b>				
Treatment	-0.321-2.86	3.02	1.80-2.86	0.001
Control	-0.89-0.2390	1.83	-0.89-0.239	2.23
<b>Late Teenagers</b>				
Treatment	4.73	6.46	3.36 – 6.09	0.001
Control	0.54	2.42	-0.11- 1.20	0.101
<b>Young Adult Women</b>				
Treatment	5.55-8.73	5.94	5.55-8.73	0.001
Control	-0.08-0.800	1.36	-0.08-0.80	7.14

The table above shows the significant effect of premenstrual gymnastics against the level of anxiety in all treatment groups with p value of 0.001. In all control group premenstrual gymnastics were not influenced with the p value more than 0.05.

## DISCUSSIONS

The prevalence of women who suffered premenstrual syndrome case was varied in all three groups. The total number of subject who interested in this study was 548 women. The prevalence of women who suffered premenstrual syndrome was 442 (80.6%). The drop out number of subject participating in this study was a quite high. It was 70 (12%) from all women who counted in the post-test. The highest number of drop out was the women who were in the young adult women groups. It might be they were having a lot of daily crucial activities. Moreover, it might be also because of the length of the treatment (premenstrual gymnastics) was a five continuous days. In addition, some schools have different program such as days off, clinical practice activity, and examination time.

The average age of menarche in the early teenagers, late teenagers and young adult women in the treatment group and the control group are almost the same. The women experienced the age of menarche approximately at 12 years old. The minimum and maximum ages of menarche were at 9 and 18 years respectively. In addition, it is assumed from the study that the age of menarche became earlier a year within the last two decades. The study showed that average age of menarche of early teenagers was at 11 years. Moreover, the average age of menarche for late teenagers and young adult women were 12 and 13 years respectively.

However, some study concluded that the minimum age of menarche was at 11 years the last decade. In this study, the currently minimum age menarche is at 9 years old. This is likely caused by internal factors and external factors that affect the maturation of reproductive age individually, such as nutritional status, activity daily living, Basal Mass Index/ BMI, and psychological status. <sup>(21)</sup> The external influencing factors contributed with this issue were exposure for media social, lack of external supports, and environmental atmosphere<sup>(22)</sup>

The habit to overcome the negative effect of symptoms on premenstrual syndrome were varied. The highest percentage was consuming herbal medicine. This is probably caused by increasing of awareness of society culture and local wisdom utilization. Moreover, supported by a wide range of information that encourages the use and benefits of herbal medicine scientifically through books, journals, and internet. Besides, most young adult

women aware on PMS by aerobic exercise, jogging, run, and other physical activities. Watching television, warm compresses and pharmacology medicine were less used in all groups both in treatment and control groups.

The history of the mother about PMS varied in all groups. The data obtained that the more mature is the more awareness to know the medical history of premenstrual syndrome experienced by the mother. Moreover, the less percentage of groups who did not know about the history of PMS was young adult women. Most women, who knew her mother medical history, stated that more than the majority of subjects have a biological mother with a history of premenstrual syndrome. It is suitable with the research that the mother menstrual history may heritage to the children <sup>(23,6)</sup>.

The average intensity of pain in the pre-test treatment was higher than of that in the control group. While, the average intensity of pain in the post test treatment group was lower than of that in the control group. This happened in the early teenagers, late teenagers, and young adult women.

The average levels of anxiety in the pre-test treatment group were higher than of that in the control group. Instead, the average levels of anxiety post test treatment group were lower than its in the control group. This occurs at early teenagers, late teenagers, and young adult women. On the other hand, none had severe anxiety level at the post-test treatment group. However, there were some women who suffered severe anxiety in all control group. This is proved by the level of anxiety was more than 28 score.

Normality data was done with Kolmogorov Smirnov. The data which were not normal was done with transformation data. The mean of pain intensity and anxiety level at pretest of three intervention groups were higher than of that at three control groups. Premenstrual gymnastics decreased the intensity of pain and the level of anxiety. There was a relationship between premenstrual gymnastics with intensity of pain and level of anxiety with p value at 0.001 and p 0.001 respectively. Premenstrual gymnastics does not affect the intensity of pain in the control group at early teenagers, late teenagers, and young adult women. This is evidenced by the p-value at 0.194, 0.100, and 0.360 respectively.

The premenstrual gymnastics affect the level of anxiety in the experimental group at early teenagers, late

teenagers, and young adult women with p-value at 0.000 all age groups. Gymnastics does not affect the level of anxiety in the control group at early teenagers, late teenagerse, and young adult women. This is evidenced by the p-value at 0.251, 0.101, and 0.109.

## CONCLUSION

The prevalence of premenstrual syndrome is 80.6%. The age of menarche is getting early a year in the last two decades. Consuming herbal medicine is the most choices for overcoming PMS. Exercise improves the women lifestyle. Most subjects have a PMS history from their mother. The mean of pain intensity and anxiety level at pretest all intervention groups are higher than of that at three control groups. Premenstrual gymnastics decreased the intensity of pain and the level of anxiety. There are relationships between premenstrual gymnastics with intensity of pain and level of anxiety with p value at 0.001 and p 0.001 respectively

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# Dietary Diversity in Agricultural and Coastal Area as Potential Source for the Prevention of Child Stunting in Sidoarjo District

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## ABSTRACT

Stunting is one of public health nutrition problem in Indonesia that will likely reduce the potential human resources capacity in the near future. However, Indonesia could have prevented the problem since it has the potential food sources from the agricultural and coastal region. This study aimed to analyze the relationship between dietary diversity in the agricultural and coastal area with the prevalence of child stunting.

The design of the study was cross sectional involving 55 under five years old children and their mother. Dietary diversity was measured using the Individual Dietary Diversity Score (IDDS) and stunting was determined using height-for age index using the WHO 2005 standard. Statistical analysis used to test the hypothesis was logistic regression. The results showed that the prevalence of child stunting was 28%. Food groups consumed in the agricultural as well as coastal area were dominated by starchy food, meat, fish and egg. There was significant correlation between child stunting and dietary diversity in agricultural and coastal area in Sidoarjo District (p-value=0,019; OR=5,49; 95% CI=1,32-22,93). Compare to children living in a household with good dietary diversity, those who live in a poor dietary diversity household have 5 times risk of being stunted. In conclusion, the significant correlation between good dietary diversity in the agricultural and coastal area of Sidoarjo District and child stunting indicated potential diet to reduce stunting. The majority of the diet in the study involved consumption of starchy food, fish and egg.

**Keywords:** *dietary diversity, stunting, agriculture, coastal area*

## INTRODUCTION

Children need sufficient food to support the process of growth and development both physically and motoric<sup>(1)</sup>. Growth and development during childhood will be optimal with the right amount and good quality food<sup>(2)</sup>. Nutrients deficiency in children causing decreased physical growth and motor development<sup>(1)</sup>. According to the Indonesian Ministry of Health, malnutrition in infant causes a higher risk of chronic illness when they grow<sup>(3)</sup>.

Problems of malnutrition and excessive nutrients can be prevented by socializing balanced-nutrition messages. Consuming a variety of food consisting of staple food, side dishes, vegetables, and fruits and with considering the amount and type according to the needs, is the principle of balanced nutrition<sup>(3)</sup>. Introducing and providing a variety of food items for children can complement the nutrients needed because each food contains different nutrients<sup>(2)</sup>.

Based on the Ministry of Agriculture in 2016, adequate food fulfillment can be reflected from the availability of food. Indonesia as an agrarian and maritime country has the potential to provide food sources. The fulfillment of food still rely on agricultural resources, yet empower other resources such as fisheries<sup>(4)</sup>. Rice consumption in 2015 is 98.39 kg/cap/year and this figure shows an increase of 1.22% from 2014<sup>(5)</sup>.

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Research on the diversity of food as measured by *Dietary Diversity Score* (DDS) in Ghana shows that the



diversity of food consumption can significantly increase the energy, nutrient intake, and nutritional status of children ( $p < 0.05$ )<sup>(6)</sup>. Other studies suggest that there is a relationship between food diversity and *stunting* in children. This is related to the consumption of low protein-containing food groups, showing that there is a significant relationship between protein intake and *stunting* in children<sup>(7)</sup>.

Another study mentioned that children with low energy intake were significantly associated with low nutritional status according to weight-for-age<sup>(8)</sup>. The relationship of protein intake and nutritional status of children under five also showed significant results, which means that children with low protein intake had low nutritional status according to weight-for-age and weight-for-height<sup>(8)</sup>. Dietary Diversity Score is calculated by summing the food groups consumed using the 24-hour food recall method. The results of IDDS can be grouped into three categories of low food diversity if  $\leq 3$  food group, medium if 4-5 food groups, and high if  $\geq 6$  food groups<sup>(9)</sup>.

Undernutrition conditions in infants reflect poor eating habits because at this age, most children only want to consume one type of food alone<sup>(10)</sup>. The diversity of food consumption is influenced by various factors such as knowledge of nutrition, number of household members, socioeconomic, and food availability. The diversity of food consumption can also be used as an indicator of food insecurity<sup>(11)</sup>.

Based on data from the Central Bureau of Statistics (BPS), the use of land in Sidoarjo regency in addition to residential areas for agricultural land is 17,205 hectares<sup>(12)</sup> and aquaculture is 15,729 ha. The agricultural sector is a strategic sector because it provides the people with food needs. Enterprises in the agricultural sector to meet food needs, among others, by increasing production and biodiversity<sup>(13)</sup>.

Agriculture is closely related to the consumption of food for the community because agriculture is able to provide adequate nutrition from food processing and unprocessed foods (14). If food produced by the agricultural sector is available in sufficient quantities and varies at different levels of society, there will be no malnutrition. A healthy peasant family will produce good labor and agricultural output. Poverty and low household food consumption will lead to malnutrition<sup>(15)</sup>. Increased production of crops will affect the availability

of local food and food prices<sup>(14)</sup>. The excellent potential of Sidoarjo Regency in agriculture sector consists of various commodities such as rice, soybean, and lowland vegetables (spinach, kale, and mustard).

Ponds are able to produce a variety of typical fishery resources in the form of fish and other brackish water animals such as shrimp, crab, and shellfish<sup>(16)</sup>. Aquaculture can meet the needs of fish and can meet the food and nutritional community in particular to meet the needs of protein consumption society<sup>(16)</sup>.

Leading commodities from the fishery sector are shrimps and milkfish. In addition, the existence of ponds is an abundance of the availability of biological natural resources that can meet the needs of animal protein<sup>(17)</sup>. Indonesia is included in 17 countries from 117 countries that have three nutritional problems such as *stunting*, *wasting*, and *overweight*<sup>(18)</sup>. Aquaculture activities in addition to having benefits for the availability of food sources of protein, is also a fishery cultivation that can be a source of livelihood and income for the community.

According to the Food Security and Extension Counseling Agency (BKP3), Sidoarjo Regency has not fulfilled food consumption diversity the principles of diverse, nutritious, balanced and safe food<sup>(19)</sup>. This can be seen from the score of Food Pattern Expectations (PPH) of Sidoarjo regency that has not met the target. PPH scores on agricultural agroecology area was 83.95 and in fishery agroecology area was 87.32, while for the target of own PPH score was 95<sup>(20)</sup>.

The prevalence of under-five children under five in Sidoarjo Regency in 2015 is 4.9%, whereas malnourished children under five are 0,022%<sup>(21)</sup>. Therefore, researchers want to see the diversity of food in agricultural areas and ponds to prevent the occurrence of stunting in Sidoarjo.

## MATERIAL AND METHOD

This study is observational analytic research with *cross sectional* design. The population of this research was household whom has children aged under five in Wonokasian and Kalanganyar Village. The area was selected because it is the area that has the potential in agriculture and the largest pond in the region of Sidoarjo district.

The samples were children aged 2-5 years old in the village area with the mother/caregiver as respondents. The sample in this research was 55 and

selected using *proportional random sampling*. Data collection was conducted through interviews with questionnaires, food diversity using IDDS, food recall 2x24 hours, weight weighing using digital scales and height using microtoise. The questionnaire contains the characteristics of families and children. For the start, researchers measured children's weight and height then interviewing children's mother or caregiver and for food diversity, IDDS was used.

**Table 1: Children's Dietary Diversity in Sidoarjo District**

No.	Dietary Diversity	Agroecology			
		Agricultural		Coastal	
		n	%	n	%
1.	Low	10	33,3	4	16
2.	Moderate	14	46,7	14	56
3.	High	6	20	7	28
Total		30	100	25	100

**Table 2: Children's Nutrient Intake Distribution**

No.	Dietary Intake		Agroecology			
			Agricultural		Coastal	
			n	%	n	%
1.	Energy	Low	19	63,3	14	56
		Adequate	10	33,3	10	40
		High	1	3,3	1	4
2.	Carbohydrate	Low	28	93,3	21	84
		Adequate	2	6,7	3	12
		High	0	0	1	4
3.	Protein	Low	2	6,7	2	8
		Adequate	11	36,7	6	24
		High	17	30,9	17	68
4.	Fat	Low	9	30	8	32
		Adequate	16	53,3	11	44
		High	5	16,7	6	24

**Table 3: Children's Nutritional Status**

No.	Nutritional Status	Agroecology			
		Agricultural		Coastal	
		n	%	n	%
1.	Severe stunted	4	13,3	3	12
2.	Stunted	4	13,3	4	16
3.	Normal	22	73,3	18	72
4.	High	0	0	0	0
Total		30	100	25	100

## FINDINGS

In this study, there was significant correlation between child stunting and dietary diversity in agricultural and coastal area in Sidoarjo District ( $p$ -value = 0,019; OR = 5,49; 95% CI = 1,32-22,93). As can be seen in table 1, the average value of dietary diversity in agricultural groups and coastal are in the medium group. In agriculture

group there are 14 children (46.7%) and coastal there are 14 toddlers also (56.0%). Groups of food consumed by children in agricultural and coastal area dominated by starchy food, milk and dairy products. Other food groups that widely consumed by children in agricultural areas and ponds are meat, fish and eggs. Consumption of green vegetables is higher in the coastal area while vegetables and fruits is higher in agricultural areas.

Fulfillment of nutritional intake in children can be determined from the quality and quantity of food consumed. Energy and protein intake is assessed using *food recall 2 × 24* hour and then converted with *Nutrisurvey*. Further analysis was done by comparing the *output of nutrisurvey* with Nutritional Sufficiency (AKG).

Can be seen in table 2, the results showed that energy sufficiency in both agriculture and coastal area are mostly in low category with 19 children (63.3%) and 14 children (56%) consecutively. Equal with carbohydrate

adequacy, in both areas are mostly in low category with 28 children (93,3%) and 21 children (84%). Meanwhile, in protein adequacy in both areas are mostly in high category with 17 children (30,9%) and 17 children also (68%). For fat adequacy, in both areas are mostly in moderate category with 16 children (53,3%) and 11 children (44%).

The higher the result of dietary diversity in children illustrates that they tend to consume more varied foods compared to them with low result. The more varied we consumed then the better nutrients that will enter the body. As we know, one type of food does not contain all the nutrients therefore we need to consume a variety of food so nutritional needs will be met.

As can be seen in table 3, majority children's nutritional status in both areas were in normal with 22 children (73,3%) and 18 children (72%) consecutively. Infants and young children is in critical age for growth and development. They need energy- and nutrients- dense foods in order to grow and develop both physically and mentally<sup>(22)</sup>. Our study revealed that there is positive association between dietary diversity and stunting in children. Households with food insecurity showed higher prevalence in child stunting. Low varied foods consumption tends to effects conditional growth in children height. In line with study from Busert et al who examined dietary diversity and expected height in rural areas in Nepal. Her study found that dietary diversity had positive association with growth height in children. Children with low dietary diversity, the expected height were not met<sup>(23)</sup>.

Study from Arimond who investigated dietary diversity and child nutritional status in 11 different country, showed that country with highest prevalence of stunting tend to had lower mean dietary diversity score<sup>(22)</sup>. Study in Kenya also showed household with severe food insecurity and poor dietary diversity had higher number in stunting children<sup>(24)</sup>.

Dietary diversity is associated with child nutritional status, which interacted with several factor such as geographical factor<sup>(22)</sup>. In this study, high-protein adequacy mainly caused by the geographical factor. Our participants lived in agriculture and coastal area which had high availability in protein-dense foods including fish and prawns. Thus, children in these areas tend to consumed protein-dense food as daily consumption. Areas with high agricultural biodiversity improves

household food security and dietary diversity<sup>(24)</sup>. A more diverse diet has the potential to provide a more abundant supply both macro- and micronutrient therefore would ensure greater food and nutrition security<sup>(24)</sup>.

## CONCLUSION

One factor contributes in dietary diversity is geographical factor. A more diverse geographical factors will improve dietary diversity and furthermore will prevent child stunting. Several factors contribute in agricultural and costal products' sustainability including weather, economy, climate change, pollution and soil degradation. Thus, it is necessary to maintain agricultural and coastal productivity to maintain food availability which in long term will reduce children stunting prevalence.

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**Ethical Clearance:** This study is approved by The Health Research Ethics Committee at Faculty of Public Health Universitas Airlangga (reference number: 166-KEPK)

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# Eating Patterns and Physical Activity to Reduce Diabetes Melitus Type 2

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## ABSTRACT

Diabetes mellitus type 2 is a hyperglycemic disease caused by insensitivity of cells to insulin. Prevalence of diabetes mellitus in Indonesia by doctor diagnosed there are 2,1% and the biggest fourth of people with diabetes mellitus disease in the world. The objective are to explain the effect of eating patterns and physical activity to diabetes mellitus type 2. This study used case control study with 70 people sample who were patients in RSUD Dr. Doris Sylvanus Palangka Raya. The sample was divided into two groups: 35 respondents case group (type 2 DM patients) and 35 respondents control group (not people with type 2 diabetes). Data analysis in this study used univariate analysis, bivariate analysis (chi square) and multivariate analysis (logistic regression). The variables affecting of DM type 2 happen were eating patterns value = 0,016 (OR = 3,33; CI95% = 1,235-8,997) and physical activity value p = 0,006 (OR = 5,16; CI95% = 1,493-17,883). The variables that have no effect are age, type, education, obesity, blood pressure and family history (p > 0.05). Physical activity is the most influential variable effect of type 2 diabetes happen. The People who doing physical exercise less than three times a week have the risk five times exposed to get type 2 diabetes mellitus disease than the people with physical activity at least three times a week after good eating patterns controlled. The recommendation study are need counseling and nursing discussion about physical activity and eating patterns especially with diabetes mellitus patients.

**Keywords** : *physical activity, type 2 diabetes mellitus, eating pattern*

## INTRODUCTION

Diabetes mellitus is a world health problem that is considered one of the five main causes of morbidity and mortality among people<sup>1,2</sup>. Diabetes mellitus is a symptom that arises in a person due to an increase in blood sugar (glucose) chronically due to insulin deficiency both quantitatively and qualitatively<sup>2</sup>.

The prevalence of diabetes in adults aged 18–99 years was estimated to be 8.4% in 2017 and predicted to rise to 9.9% in 2045. The high prevalence of diabetes has important social, financial and development implications especially in low and middle-income countries<sup>3</sup>. Indonesia the ranks fourth in 10 countries with the highest number

of patients diabetes mellitus. Basic Health Research (Riskesmas) in 2013 shows the prevalence of diabetes mellitus in Indonesia which is diagnosed by doctor or symptom 2,1%<sup>4</sup>. According to the World Health Organization (WHO) data, Indonesia in the number of people with diabetes mellitus that is 7%<sup>5</sup>.

Some factors is caused diabetes mellitus include genetic or hereditary factors, viruses and bacteria, toxic and toxic substances, nutrition, lifestyle. Environmental factors and unhealthy lifestyles, such as overeating, fat, lack of activity and stress play a huge role as a trigger diabetes mellitus<sup>6,7</sup>.

Diet is a good role for influencing of diabetes mellitus indicate. Moreover, diet related with lifestyle. The diet in the cities has shifted from the traditional diet that contains lots of fiber, vitamins and minerals, to an all-round modern diet, with the composition of foods that contain too much protein, fat, sugar, and little fiber<sup>8,12,13</sup>.

Physical activity is a physical movement of the body and its supporting system, in the DM disease physical

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activity becomes the determinant part of the glucose index because in a person doing physical activity either mild, moderate, or heavy will require calories or energy. Energy or calories in the human body is a process of cell metabolism, the main source of energy in the human body, among others, glucose, glycogen and triglycerida. Human physical activity requires calories, while the material from calories is glucose so that the heavier the activity level the more blood glucose it uses. Physical activity is very influential in diabetes mellitus type 2 patients because blood glucose can enter the cells with high metabolism in the cell. Physical activity for people with diabetes type 1 should be noted the signs of hypoglycemia because glucose in the blood can not enter and make insulin not produced by pancreatic beta cells that function to deliver glucose as an energy material. Physical exercise is one of the pillars in diabetes management<sup>9,10,11</sup>.

Based on Health Profile, Central Kalimantan Province is also faced with double burden problem where there are increasing cases of degenerative diseases such as hypertension and diabetes mellitus. Infectious disease cases are still high, but on the other hand degenerative diseases also increase. In the province of Central Kalimantan in 2012 amounted to 3,855 cases and increased in 2014 to 4,167 cases.

Based on the background that has been described above, it appears that diabetes mellitus type 2 is a serious health problem that must be overcome by controlling risk factors. So the problem formulation in this research is DM in Central Kalimantan is high, as evidenced from medical record data in RSUD dr. Doris Sylvanus Palangka Raya. DM incidence from 2013 (1.4%) increased to (1.5%) by 2015 and DM became the first in 10 patient diseases. One of the factors of DM is diet and physical activity, diabetes type 2 can still be controlled or managed and more suffered because the body does not produce sufficient hormone insulin or insulin can not be used properly again (insulin resistance). Can be caused of lack attention to good diet and lack of physical activity such as exercise can cause diabetes mellitus type 2.

## METHOD

The research design used was case control. In this study the researchers differentiated into 2 ie the case group was all patients diagnosed with diabetes type 2 (n = 35) and the control group was a patient he did

not diagnosis as patients with type 2 diabetes (n = 35). Sampling technique for case group with total population and for sampling control using accident sampling. In this research the researcher is assisted by 1 nurse who served in polyclinic disease in dr. Doris Sylvanus to assist researchers in explaining the research objectives and participation of respondents in this study. The data were collected by interviewing the variables of age, sex, education, family history, diet, and physical activity. BMI variable premises measure height and weight. The pressure and resistance variables of diabetes mellitus type 2 were obtained from the medical record.

The inclusion criteria of the case groups were: DM type 2 patients who had been examined in the polyclinic of internal medicine (medical record) based on doctor's diagnosis in RSUD Doris Sylvanus; age  $\geq 45$  years; able to communicate well; willing to be a respondent. The inclusion criteria for the control group were in-patients with undiagnosed type 2 diabetes; age  $\geq 45$  years; able to communicate well; willing to be a respondent.

Data analysis in this study used 3 stages: univariate analysis, bivariate analysis using chi square and multivariate analysis using logistic regression.

## RESULTS AND DISCUSSIONS

Respondents in the case and control group had similar characteristics, including: age, sex, education, BMI, eating pattern, blood pressure and family history, physical activity (table 1). There are only two variables that are significantly associated with diabetes: eating pattern and physical activity. Respondents who do not eat well in the diabetes group more three times bigger than control group (p = 0,016, OR = 3,33). Respondents in diabetes group with less activity have five times more risk diabetes than in the control group (p = 0.006, OR = 5.16).

**Table 1: Distribution of age, sex, education, BMI, eating pattern, blood pressure, family history, physical activity in case group (Type 2 DM) and control group (non-diabetic)**

No.	Variabel	Case		Control		P
		n	%	n	%	
1.	<b>Age</b>					0,806
	$\geq 60$ Years	13	37,1	14	40,0	
	45-59 Years	22	62,9	21	60,0	

Conted...

2.	<b>Sex</b>					1,00
	Female	19	54,3	19	54,3	
	Male	16	45,7	16	45,7	
3.	<b>Education</b>					0,629
	Low	14	40,0	16	45,7	
	High	21	60,0	19	54,3	
4.	<b>BMI</b>					0,811
	Obesity	16	45,7	17	48,6	
	Not Obesity	19	54,3	18	51,4	
5.	<b>Eating Pattern</b>					0,016
	Not good	20	57,1	10	28,6	
	Good	15	42,9	25	71,4	
6.	<b>Blood Pressure</b>					0,473
	abnormal	20	57,1	17	48,6	
	Normal	15	42,9	18	51,4	
7.	<b>Family History</b>					0,621
	Derivative	21	60,0	23	65,7	
	Underivative	14	40,0	12	34,3	
8.	<b>Physical Activity</b>					0,006
	Less Exercise	14	40,0	4	11,4	
	Moderate Exercise	21	60,0	31	88,6	

**Relation of age with Type 2 DM:** The age proportion of respondents in this study showed that from 35 respondents case group (diabetes mellitus type2 patients) aged 45-59 years there are 22 people (62.9%) rest aged  $\geq 60$  years. Based WHO data on diabetes country profile for Indonesia the prevalence of diabetes was higher in older age groups<sup>2,5</sup>. Person ( $\geq 45$  years old) has an increased risk of developing DM and glucose intolerance caused by degenerative factors that decrease body function<sup>14</sup>. Diabetes mellitus was the second leading cause of death in the 45-54 age group in urban areas (14.7%) and the six times higher in rural areas (5.8%)<sup>15</sup>. Diabetes often appears after a person has entered this prone age, especially after the age of 45 years. Data from Riskesdas 2013 also showed a correlation between the increased age and the incidence of diabetes mellitus<sup>4</sup>.

The results of this study is relatively the same as that proposed by the International Diabetes Federation (IDF), for 90-95% of people with diabetes type 2 usually aged more than 40 years. There is a relationship between age and the incidence of DM<sup>16</sup>.

Respondents of case group that is suffer of DM Type 2 aged  $\geq 60$  years of proportion is smaller than the age of

45-59 years. This is because the number of patients with diabetes type 2 aged not more than 60 years.

**Relation of gender with DM Type 2:** Male has a risk of diabetes increases faster. Scientists from the University of Glasgow, Scotland revealed it after observing 51,920 men and 43,137 women. All are people with diabetes type 2 and generally have a body mass index (BMI) above the limit of overweight or obesity. Men exposed to diabetes on BMI averaged 31.83 kg / m<sup>2</sup> while new women experienced it in BMI 33.69 kg / m<sup>2</sup>. This risk difference was influenced by body fat distribution. In men, fat accumulation is concentrated around the abdomen, which triggers central obesity risking more metabolic disorders<sup>9,10</sup>. The proportion of respondents' gender in this study were female respondents in both case and control group, 19 (54,3%) responder same as male respondent both case and control were equal to 16 (45,7%) respondent.

This is different from some previous research because the results of this study men and women have not too much different in the case there are 19 female respondents and 16 male respondents. Although the patients at Doris Sylvanus Hospital of Palangka Raya were dominated by female patients, the sex were not significantly related to the occurrence of diabetes type 2. However, the results of Awad research (2013) in Endocrine Polyclinic RSU Prof.Dr.R.D.Kandou Manado prove that patients diabetes type 2 are women<sup>17</sup>. This may explain the fact that women are more sensitive to insulin than men. The function of the hormone insulin produced by a group of pancreatic beta cells that play a role in the metabolism of glucose for the body's cells. When the fat content in the blood increases due to dietary factors that contain cholesterol, then the hormone insulin is more widely used to burn fat. As a result the body lacks the hormone insulin to facilitate the metabolism of sugar in the blood. Thus any person with sex of both men and women have the same risk of exposure to DM if the diet is not good.

**Relation of education with DM Type 2:** This study showed that from 30 respondents with low education there were 14 (40,0%) respondents in case group and 16 (45,7%) respondents in control group. Statistically the difference in proportions is 40.0% and 45.7% is not significant, corresponding to the p value of 0.629 ( $p > 0.05$ ). There is no relationship between the level of education with the incidence of diabetes mellitus type 2 in RSUD Doris Sylvanus Kota Palangka Raya.

This is clearly different from the research conducted by Fatmawati (2010)<sup>18</sup> that people with high school and college education (SMA) are at higher risk of diabetes than people with primary and junior secondary education ( $p = 0.002$ ,  $OR = 0.325$ ). This can happen because increasing levels of education, a person more interesting to accept himself as a sick person when he or she experiences certain symptoms than a more primitive group of people and thus seen from a study in control case of 21 respondents with higher education is seen more likely to check himself to the hospital. They are also reported to be quicker to seek medical help than people with lower social status. Lower educational level is a predictor of incident type 2 diabetes<sup>19</sup>.

**Relation of BMI with DM Type 2:** Obesity is a major risk factor for diabetes mellitus type 2 and also causes sleep disorders such as obstructive sleep apnea (OSA), studies of the last few decades suggest an independent relationship between the two<sup>20</sup>. The proportion of respondents who are obese and not obese is very different. This is also seen from the calculation of body mass index (BMI) in this study that the proportion of respondents who most often exist at normal weight (18.5-22,9) (41.4%). The proportion of respondents in obestration I (25.0-29,9) was also quite high, from 70 respondents there were 28 (40%). This can happen because the higher of income lever a person, the level of food consumption is less attention, so tend to experienceobobitas. The more fat tissues, body tissues and muscles will become more resistant to insulin resistance, especially when body fat or overweight accumulates in the central obesity. This fat will block the work of insulin so that glucose can not be transported into cells and accumulate in the bloodstream. Body fat tend to store more body fat and unburned fat, there is a deficiency of insulin hormone for carbohydrate burning, so more likely to happen diabetes mellitus type 2.

In general, this study showed that from 33 obese respondents there were 16 (45,7%) respondents in case group and 17 (48,6%) in control group. Statistically the difference of the proportion is 45.7% and 48.6% is not significant, according to the p value of 0.811 ( $p > 0.05$ ). There is no significant relationship between obesity (obesity) with the incidence of DM type 2 in RSUD Doris Sylvanus Kota Palangka Raya.

This is different from the research conducted by Fatmawati (2010)<sup>18</sup> that obesity 3.3 times the risk of the

incidence of diabetes mellitus type 2. This can happen because of income level of a person, the level of food consumption is less attention, so tend to experience theobesitas and also because of the high their income is not paying attention when body fat or overweight is a very dangerous problem for themselves. Body mass index has a strong relationship to diabetes and insulin resistance. In obese individuals, the amount of nonesterified fatty acids, glycerol, hormones, cytokines, proinflammatory markers, and other substances that are involved in the development of insulin resistance, is increased<sup>21</sup>.

**Relation of eating pattern with DM Type 2:** Diet has a major role in influencing of diabetes mellitus. Moreover, diet is also very closely related with lifestyle. The diet in the cities has shifted from the traditional diet that contains lots of fiber, vitamins and minerals, to an all-round, modern diet, with the composition of foods that contain too much protein, fat, sugar, and little fiber. The composition of food, especially in the ready-to-eat foods of late is very popular<sup>12,13</sup>.

The respondents' diet in this study varied greatly when viewed from the source of daily intake of carbohydrates, proteins and fats. Source of carbohydrate most respondents per day is rice, ie as many as 38 (54.3%) of respondents consume rice 3 times per day. The source of animal protein of respondents per day is fish (29,4%) consume fish 3 times per day. For the source of fat intake per day is palm oil is 41 (58.6%) of respondents use palm oil 2 times per day.

Meanwhile, for the source of intake per week is not much different from the source of intake per day. The highest source is animal protein of respondents was 53 fish (75.7%) and skinless chicken (42%), while vegetable protein was 57 (81.4%) and 55 (78.6%). For the source of fat intake of the week, respondents mostly used palm oil 57 (81,4%), and all respondents in this research no one use margarinadan butter. Because the selection of foods containing canincreases fatis the risk of diabetes or diabetes mellitus caused by hormone imbalance in the body. In consuming sweet foods and the use of sugar in the diet is actually allowed if the portion is not excessive for diabetics and non-diabetics. Foods with simple carbohydrates will tend to cause a spike in blood sugar levels so excessive consumption of carbohydrates should be avoided, especially carbohydrates in rice and white bread. In simple carbohydrates will be more likely to increase the release of sugar into the bloodstream.



The release of sugar into the blood will then stimulate the release of insulin by pancreatic beta cells this can stabilize blood sugar levels. However, if the intake of carbohydrates increases then the release of sugar into the bloodstream will continue to rise. As a result, insulin secretion will continue to occur so that the increased risk of damage to beta cells of the pancreas (pancreatic beta cell fatigue index increased). In this kind of damage we should be able to prevent by consuming low carbohydrates or start consuming brown rice, black rice and wheat instead of rice and bread.

In this study, it was found that from 30 respondents with bad diet there were 20 (57.1%) respondents in case group and 10 (28,6%) in control group. Statistically there is significant correlation proportion not good in case 57,1% and proportion not good at control 28,6% hence, difference of proportion is 28,5% significant so that show there is relation between diet with incidence of DM type 2. Value OR indicated that people with poor diet had a 3.33-fold risk of type 2 DM incidence compared to a non-DM type 2 diet (control case) at Doris Sylvanus Hospital Kota PalangkaRaya ( $p = 0.016 < 0.05$ ) (CI95% = 1,235-8,997). An obese individual should either diet or control his diet to reduce caloric intake until his weight drops to an ideal level. A moderate decrease in calories (500-1000 kcal / day) will result in slow but progressive weight loss (0.5-1 kg / wk). Weight loss of 2.5-7 kg will improve blood glucose levels<sup>22,23,24</sup>. This is in line with the research conducted by Sudaryanto et al. (2014)<sup>25</sup> that respondents with poor diet have 10 times more risk of developing type 2 diabetes mellitus. Sumangkut et al., (2013)<sup>26</sup> also indicates the association between diet and the incidence of type 2 diabetes mellitus.

**Relation of blood pressure with DM Type 2:** Increased blood pressure on hypertension is closely related to improper storage of salt and water, or increased pressure from the body on peripheral blood vessel circulation (Fatimah, 2015)<sup>27</sup>. The estimated prevalence of hypertension in adults with diabetes is 20–60%, which is 1.5–3 times higher than that in age-matched individuals without diabetes<sup>28</sup>.

The proportion of respondents in this study found that of 37 respondents with abnormal blood pressure there were 20 (57.1%) respondents in the case group and 17 (48.6%) in the control group. Statistically the difference of the proportion is 57.1% and 48.6% is not significant, according to the p value of 0.473 ( $p > 0.05$ ).

Thus, there is no significant relationship between blood pressure with the incidence of type 2 diabetes in RSUD Doris Sylvanus Kota Palangka Raya.

**Relation of family history with DM Type 2:** A person with diabetes mellitus is suspected of having the diabetes gene. It is suspected that the diabetic talent is a recessive gene. Only people who bersifat homozigot dengan such recessive genes who have diabetes mellitus (Fatimah, 2015)<sup>27</sup>. Genetic factors are an important factor in Diabetes Mellitus which can affect beta cells and alter its ability to recognize and spread insulin secretory excitatory cells. This increases the susceptibility of these individuals to environmental factors that alter the integrity and function of pancreatic beta cells. The proportion of respondents indicates that of the 44 respondents who had a family history of DM, there were 21 (60.0%) respondents in the case group and 23 (65.7%) in the control group. Statistically, the difference of 60,0% and 65,7% is not significant, according to p value 0,621 ( $p > 0,05$ ). Thus, there is no significant relationship between family history with the incidence of type 2 diabetes mellitus in dr. Doris Sylvanus Kota Palangka Raya.

This study was different from the research of Wicaksono (2011)<sup>29</sup> which stated on 30 patients in Internal Medicine Polyclinic Dr. Kariadi Semarang, where the family history of DM is a significant factor of DM Type 2 which has a statistical significance and has an effect on the incidence of DM Type 2 by 75% that people with a family history of DM 42.3 times are more at risk of DM. Sudaryanto et al. (2014)<sup>25</sup> also proves that people who have a family history of DM 25 times more likely to develop DM than people who do not have a history of DM. It can be caused of lack of information or respondent knowledge also related to diabetes history owned her parents

**Relation of physical activity with DM Type 2:** Disease DM is also related with physical activity of a person. Increased weight and lack of physical activity caused of insulin resistance. Regular physical exercise can improve blood vessel quality and improve all aspects of metabolism, including increasing insulin sensitivity and improving glucose tolerance<sup>17</sup>. According to research conducted in China some time ago, if a person in his life less exercise or moderate exercise, the reserves of glycogen or fat will remain stored in the body, this is what triggers the occurrence of various degenerative

diseases such as diabetes mellitus type 2<sup>25</sup>. The pattern of life may be a big risk factor as a factor that exacerbates the condition of diabetes mellitus type 2. Such behaviors include excessive body mass index and lack of physical activity. Physical activity converts glucose into energy so that blood sugar levels can be controlled. Physical activity leads to increased insulin so that blood sugar levels will decrease. People who less exercise, food substances of the body will not be burned but dumped in the body as fat and sugar. The longer the insulin becomes less effective in changing glucose, then insulin resistance occurs

In this study, it was shown that from 18 respondents who did not perform sports activity there were 14 (40,0%) in case group and 4 (11,4%) in control group. Statistically, there was a significant correlation of non-exercise proportion in case of 40.0% and non-exercise proportion in control 11,4% hence difference of proportion was 28,6% significant so that show there is relation between physical activity with diabetes mellitus type 2 OR showed that people who did not exercise activity in the case had a risk of 5.16 times against the incidence of diabetes mellitus type 2 than people who did not do sports activities that are not DM type 2 (control cases) in RSUD dr. Doris Sylvanus Kota Palangka Raya ( $p = 0,006 < 0,05$ ), (CI95% = 1,493-17,883). This research is in line with the research conducted by Fatmawati (2010), there is a relationship between sports activity with the incidence of diabetes mellitus type 2 (OR = 0.391;  $p = 0.005$ ). Because if we do less physical activity then consumed sugar will also be more used, consequently the prevalence of elevated blood sugar levels will also be the higher the lack of activity is one factor that contributes in causing insulin resistance in DM type 2.

**Dominant variable influence of DM Type 2:** The independent variable used as the candidate in this *regresi logistic* is the variable with value ( $p < 0.25$ ). The method used in this analysis is *the stepwise* method. The first modeling method there is no independent variable whose value ( $p > 0.05$ ). From the eight independent variables have related with DM type 2 there are two variables have relation with the diabetes mellitus type 2 patient in dr. Doris Sylvanus Palangka Raya is dietary variables and physical activity variables. However, the two most influential variables on the occurrence of diabetes mellitus type 2 are physical activity variables as seen from OR (5,244) bigger than dietary variables.

This can be interpreted that the lack of physical activity has a chance of 5,244 times most to the occurrence of diabetes mellitus type 2 compared with non-DM type 2 (case control).

## CONCLUSION

Characteristics of respondents who more risk diabetes mellitus type 2 are age 45-59 years, female, high education, obese, hypertension and respondents who have a family history of DM.

This research has proved that dietary pattern and physical activity are associated variables to diabetes mellitus type 2. The greatest influence for DM type 2 is physical activity.

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# Relationship between Cadres Counseling about Diarrhea to Handling Child Diarrhea

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## ABSTRACT

Diarrhea is the second leading cause of death in children under five years, about 760,000 children die every year from diarrhea. Most people who die of diarrhea are actually due to severe dehydration and fluid loss. The handling of diarrheal diseases in the community both in the management of cases and for prevention is well controlled, but the problem of diarrheal disease is still a relatively big problem. The purpose to analyze relationship counseling cadres of health about diarrhea to handling child diarrhea. This research used descriptive quantitative method with cross sectional approach. The sample were cadres which follow health counseling to handling children diarrhea in Public Health Centre of South Purwokerto that is 48 people. Sampling technique used by simple random sampling. Data analysis using Spearman's Rank correlation. Media of counselling used audio visual and demonstration about diary management. Spearman's Rank correlation test results obtained p value = 0.001 ( $\alpha = 0.05$ ) which means  $H_0$  rejected and  $H_1$  accepted, so that there is a relationship between health counseling cadres and handling of children diarrhea in Public Health Centre of South Purwokerto. Cadres who follow counseling well able to handle diarrhea children better by 67%. Handling of diarrhea in children is done in simple non-pharmacotherapy. The counseling cadres about diarrhea effectively to handling of children diarrhea in Public Health Centre of South Purwokerto. The importance for cadres health education program to the handling of diarrhea in children, so hopefully this program can be sustainable.

**Keywords:** Diarrhea, Handling, Health Counseling, Cadres

## INTRODUCTION

Diarrheal diseases are still a global problem with high degrees of morbidity and mortality in many countries, especially in developing countries. Indonesia is one of the developing countries with high incidence of diarrheal diseases due to high morbidity and mortality<sup>1</sup>. Endemic diarrheal disease also often appears as an outbreak (AOB) and followed by many victims. To overcome diarrhea diseases in the community both the management of the case and for the prevention is quite

controlled. However, the problem of diarrheal disease is still a relatively big problem<sup>2</sup>.

Diarrheal disease is one of the causes of mortality and morbidity of children in the world. Diarrhea is the second leading cause of death in children under five years, about 760,000 children die every year from diarrhea. Most of them are caused by food and water sources contaminated with diarrhea. A total of 780 million people have no access to drinking water and 2.5 billion people have no sanitation. Infectious diarrhea is widespread throughout the developing world. Most people who die of diarrhea are actually due to severe dehydration and fluid loss<sup>3</sup>.

Based on data from Basic Health Research in 2013 there are 30775 cases of diarrhea. From these data indicate that diarrhea cases ranks seventh of the top 10 other diseases, while the incidence of diarrhea in Toddlers ranks second of 10 other diseases. Diarrhea was the number one cause of death in infants (31.4%)

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and toddlers (25.2%), whereas in all age groups it was the fourth cause of death (13.2%)<sup>4</sup>.

In 2015 there are 18 times the outbreak of diarrhea with the number of people with 1213 people and the death of 30 people (2.47%). The mortality rate when outbreak of diarrhea is expected to be <1%. Based on the recapitulation of outbreaks of diarrhea from 2008 to 2015, the 2008 mortality rate was still quite high (> 1%) of 2.94%, except in 2011 the mortality rate at AOB was 0.40%, while in 2015 the number death of diarrhea when the outbreak even increased to 2.47%. National morbidity results from the Diarrhea Morbidity Survey of 2012 which amounted to 214/ 1.000 population. So it is estimated that the number of diarrhea sufferers in health facilities as much as 5,097,247 people, while the number of diarrhea patients reported to be handled in health facilities as many as 4,017,861 people or 74.33%. The data is still below the national target of 5.405.235 or 100%<sup>5</sup>.

The proportion of cases of diarrhea in Central Java in 2015 amounted to 67.7 percent, decreased when compared to 2014 proportion of 79.8 percent. This suggests discovery and reporting still need to be improved. Cases found or treated in both government and private services have not been reported. For gender-based cases between men and women more women, this is due to the fact that women are more likely to be associated with diarrheal risk factors, which are transmitted through oral fecal, particularly related to clean water, food serving and clean and healthy live behaviour (CHLB). The highest number of cases of diarrhea was Kebumen by 202.5 percent, while the district with the lowest discovery rate was Brebes 11.9 percent. The number of cases of diarrhea in Banyumas Regency is in the order of 18, which is 67.8%<sup>6,24</sup>.

Case of Diarrhea in Banyumas District from year to year is still high compared with other cases of illness. The number of diarrhea of Banyumas District in 2014 is 214/1000 population, while in 2013 it is 21.55/1000 population. Coverage The finding of Diarrhea case in 2014 is 100%. The number of diarrhea cases found in 2015 amounted to 35006 cases, while the number of diarrhea cases handled amounted to 23728 cases (67.8)<sup>21</sup>.

Based on research Suryati (2014), that there is a relationship between educations with the activeness of posyandu cadres in the prevention of childhood diarrhea<sup>8</sup>. In line with Agustina's (2012) research, it is conveyed that there is a relationship between health counseling about prevention of diarrhea in infants with mother attitude in prevention of diarrhea<sup>9</sup>.

Diarrhea case data at Puskesmas Purwokerto Selatan in 2015 amounted to 1174 cases. Based on preliminary study conducted on 07 November 2016 at Puskesmas Working Area of Purwokerto Selatan that case of diarrhea that happened to children under five from July 2016 until October 2016 counted 90 people under five. On average per month as many as 23 people under five suffering from diarrhea.

The purpose of this research is to know the relationship of health counseling about diarrhea to the handling of diarrhea in children in society.

## METHOD

The type of research used in this research is quantitative with analytic design using cross sectional approach. Analyzed to find out the relationship of health counseling about diarrhea about the handling of diarrhea in children. The samples examined were some of the cadres who followed the counseling of diarrhea handling in the children at Puskesmas Purwokerto Selatan in November 2016. Number of respondents 48 cadres. The sampling technique used in this study is by Simple Random Sampling of the total population of 265 cadres.

## RESULTS

### 1. Univarible Analitic

#### 1.1 Characteristic of Respondents

**Table 1: Characteristic of Respondents**

Variable	Frequensi (n = 48)	Percentage (%)
<b>Age (year)</b>		
< 25	2	4,2
25–35	16	33,3
> 35	30	62,5
<b>Education</b>		
Low	21	43,8
Middle	24	50,0
High	3	6,3
<b>Occupation</b>		
Government	2	4,2
Housewife	45	93,8
Non government	1	2,1

Source: Primer data

Based on table-1 can be explained that most respondents aged over 35 years as many as 30 people (62.5%), high school education as many as 24 people (50%), and employment as housewife as many as 45 people (93.8%).

**1.2. Health Counseling for Cadres and Handling Diarrhea**

**Table 2: Health Counseling for Cadres and Handling Diarrhea**

Variable	Frequensi (n = 48)	Percentage (%)
<b>Health counseling</b>		
Less	6	12,5
Good	42	87,5
<b>Handling diare</b>		
Less	20	41,7
Good	28	58,3

Based on table-2 can be explained that most respondents assess health counseling cadres in good category as much as 42 people (87.5%). Most of the respondents in the handling of diarrhea in children in the good category as many as 28 people (58.3%).

**2. Related Health Counseling Cadres with Handling Diarrhea for Children**

**Table 3: Related Health Counseling Cadres with Handling Diarrhea for Children**

Counseling	Handling Diare				Total		p-value
	Less		Good		f	%	
	f	%	f	%			
Less	6	100,0	0	0,0	6	100,0	0,001
Good	14	33,3	28	66,7	42	100,0	

**Source:** Primer data

Based on table-3 it can be explained that all health counseling cadre in the category enough with the handling of diarrhea in the category enough as much as 6 people (100%), and there is no health education cadre in the category enough with diarrhea treatment in good category. Counseling of health cadre in good category with diarrhea treatment in category enough 14 people (33.3%), and health counseling of cadres in good category with diarrhea treatment in good category as

many as 28 people (66.7%). Spearman’s rank correlation test results obtained p-value = 0.001 (<math>\alpha = 0.05</math>).

**DISCUSS**

**1. Characteristic Respondents**

**1.1. Age:** Age range of respondents in this study is a productive age in which work productivity can be done optimally. A person’s age affects a person’s capability and mindset on the information provided. Increasing age, the ability to catch and the mindset of a person growing<sup>10, 27</sup>.

Capture power is the ability of a person to receive information given to him. Capture power is related to the maturity of the body functions both the senses and the brain and the health of a person. Someone at the age of 30 years must have passed the growth stage of body functions. Age 30 is also a productive age in which work productivity can be performed optimally and health complaints are rarely disclosed. Maturity of body function, health and optimal productivity will influence the entry of better information, thereby increasing one’s knowledge<sup>22</sup>.

The result of Agustina’s research, about the relationship of health counseling about prevention of diarrhea in under fives with mother attitude in prevention of diarrhea in children under five years found that most of them are 31-40 years old as many as 18 respondents (44%)<sup>9</sup>. In line with Nugraha’s, study on the relationship of mother’s behavior in the prevention of diarrhea with the incidence of diarrhea in under-five children at Puskesmas Kalikajar I, Wonosobo District, it was found that the respondent’s age was mostly 41-45 years old<sup>11</sup>.

According Maulana, with increasing age also increased the experience that has been experienced by someone<sup>12</sup>. Someone by the age of 30 must have gone through a short life journey, on the way to life experience and more communicating with others. The experience and information that is quite a lot at age increasingly shapes one’s attitude towards a thing.

Adisasmito, states that maternal age is not a factor that affects the incidence of diarrhea in infants<sup>13</sup>. Young age and old age of a mother do

not affect the occurrence of diarrhea. Maternal age does not contribute to the occurrence of diarrhea, while those who contribute are knowledge, behavior and maternal hygiene.

**1.2. Education:** Most of the middle-level formal education is high school. In general, education is defined as any effort planned to influence other people, individuals, groups, or communities so that they, do what is expected by the educator<sup>10</sup>.

The higher the education of a person, the easier it is to receive information, the more the knowledge that the less educational will inhibit the development of one's attitude toward the newly introduced values<sup>14</sup>. That information obtained from both formal and non formal education can provide immediate impact to produce changes or increase knowledge<sup>15</sup>.

A person's level of education will have an effect on responding to something that comes from outside. An educated person will provide a rational response to the information coming and think about the extent to which they might gain the idea.

Suryati research, about factors related to the activeness of posyandu cadres in the prevention of diarrhea in infants found that most posyandu cadres have high school education and PT as much as 64.4%<sup>8</sup>. Education is anything consciously undertaken to nurture personality, developing a lifelong, physical and spiritual capability that lasts a lifetime within and out of school<sup>16</sup>.

The development of education can affect a person as well as the behavior of a person will the pattern of life, especially in motivating the attitude of participating in the development of health, generally the higher the education of a person will be more easily receive information so that more patterns owned<sup>17</sup>.

**1.3. Occupation:** The result showed that the respondent's job as big was housewife. Respondents work as housewives who daily take care of household affairs, so rarely have the availability of time to follow health counseling activities. Lack of health education, resulting in limited insight or knowledge, causing wrong perception so that mother to be negative to prevention of diarrhea in toddler.

The result of Agustina's research, about the relationship of health counseling about prevention of diarrhea in children under five with mother attitude in prevention of diarrhea in infants found that most work as housewife counted 26 respondents (64%)<sup>9</sup>.

**2. Health Counseling Cadres:** Respondents who evaluated cadre health counseling about handling simple diarrhea in good category were 87.5%. This shows that the willingness to learn great from the respondents. Information obtained from counseling, processed by a person to generate knowledge. The more often people are exposed to information, the more their knowledge.

In accordance with the opinion expressed by Maulana, that information is also a form of attitude. Information is accepted as an object of a pleasant attitude or not, if fun then it will be believed and eventually there will be a push to do it<sup>12</sup>. Increasing the use of health cadres can be done through training, support, and supervision of health cadres.

The high number of drop outs of health cadres can be influenced by elements of leadership and management, such as funding sources and sustainability, community ownership, and selection mechanisms. The degree of effectiveness of healthcare kader programs varies, depending on the specific definition of the impact form and when. The health cadre program with considerable success is in the field of maternal and child health<sup>18</sup>.

**3. Handling Diarrhea for Children:** Respondents who can handle diarrhea in children with good category as much as 58.3%, other respondents less good. This indicates that most of the respondents have implemented the treatment of diarrhea in children well. This condition shows increasingly get health education about about diarrhea, hence the better also way of handling diarrhea in child.

Health counseling is an educational activity conducted by spreading the message, instilling confidence, so that people not only aware, know and understand, but also willing and able to do a suggestion that has to do with health. Health counseling can influence knowledge while knowledge can influence attitude and behavior according to K-A-P theory (knowledge-attitude-practice)<sup>9</sup>.



Where new behaviors can materialize following the stages of knowledge, attitude, and practice. In day-to-day practice may happen otherwise, a person behaves positively, although his knowledge and attitude are still negative<sup>10,28</sup>.

The result of Agustina's research, about the relationship of health counseling about prevention of diarrhea in children under five with mother attitude in prevention of diarrhea in children under five stated that health counseling about diarrhea in under fives is the first step of increasing insight or knowledge of someone who can form attitude in handling diarrhea<sup>9</sup>. With frequent health counseling interesting and easy to understand can increase the knowledge of good mothers about handling prevention of diarrhea in infants will be responded positively by the mother at least from his attitude first before realized in the form of behavior (practice).

Rarely held health counseling, mother knowledge about handling of diarrhea in under five is also less than most also have negative attitude in handling diarrhea. Thus the more frequently held health counseling about prevention of diarrhea then have a role in determining better knowledge and in determining an increasingly positive attitude in the handling of prevention of diarrhea in infants.

**4. Related Health Counseling Cadres with Handling Diarrhea for Children:** All cadres with poor health assessment of cadre counseling, can not handle diarrhea well. Health education cadre in good category with diarrhea handling in good category as much as 66.7%. Spearman's Rank correlation test results obtained p-value = 0.001 ( $\alpha = 0.05$ ) which means H0 rejected and H1 accepted, so it can be stated that there is a relationship between health counseling cadres and handling of diarrhea in children in Puskesmas Area Working Purwokerto Selatan.

The existence of relationship between health education of cadre and handling of diarrhea in children according to the theory proposed by Notoatmodjo, that promotion or health education through counseling is essentially an activity or an effort to convey health message to society, group or individual<sup>10</sup>. In the hope that with the message, people, groups or individuals can gain knowledge about better health.

Health promotion is a comprehensive program of community behavior change, within the context of the community. Not only behavioral changes (within people), but also changes in the environment. Behavioral change without environmental change followed will not be effective, the behavior will not last long. Therefore, health promotion is not just change behavior but also seek to change environment, system, and so on<sup>10</sup>.

The result of Agustina's research, about health counseling relationship about prevention of diarrhea in under fives with mother attitude in prevention of diarrhea in under fives is found that there is health counseling about prevention of diarrhea in balita with mother attitude in prevention of diarrhea in under five at health center of Kandangan in 2010 (p-value= 0.031). The more active or ever get health counseling the more positive attitude of the respondent, on the contrary more inactive or never get health education more negative attitude (r-count= + 0.322)<sup>9</sup>.

The role of health cadres can be increased so that it can be a source of messages that are believed and deemed capable of providing information. Efforts that can be done, among others, by training health cadres and routine coaching so that the cadres can become a reliable health instructor.

The cadres have a noble duty. Cadre is expected to play a role as a provider of health information to the community, community mobilization to carry out health messages such as visiting posyandu and implementing clean and healthy life. Besides, the cadre can also act as the first to find out if there are health problems in the area and immediately report to local health personnel. Cadre is a liaison between the community and health personnel because the cadres are always in the midst of society<sup>5,23</sup>.

In line with Utami's, study on the effectiveness of individual verbal approaches by health cadres in improving early detection knowledge of diarrheal diseases in infants it is found that individual verbal approaches by health cadres are more effective in improving knowledge of early detection of diarrheal diseases in infants. This approach is chosen so that the delivery of materials and the implementation of the practice can work effectively<sup>19</sup>.

Based on the research of Solikhah, et al, obtained the need for implementation of cadre training on simple handling in cases of diarrhea, respiratory infections, and nutrient males<sup>20</sup>. Health education is a learning process to develop the correct understanding and positive attitude of the individual or group on health so that the concerned can apply a healthy way of life as part of the way of life everyday. One of the extension methods that can be given is the lecture method in small groups. Lectures are a way of explaining and explaining an idea, understanding, or message orally to a target group so as to obtain information about health<sup>10, 26</sup>.

### CONCLUSIONS

Most of the respondents were over 35 years old, the majority of them were high school, and the majority did not work (housewife). Respondents most of the cadre health education assessment in the good category as much as 82%, as a form of high spirit. Respondents handled diarrhea in children in good category as much as 58.3%. There is a relationship of health counseling and cadre handling of diarrhea in children at Puskesmas Working Area of Purwokerto Selatan (p-value = 0,001). The results of this study can be useful as information and knowledge about the importance of health counseling to handle diarrhea that occurs in children. Community Health Center continue the diarrhea extension counseling program to all cadres, so it can be improved as early detection of case finding. The results of this study can be useful as a reference for researchers who want to conduct further research on diarrhea, especially in terms of health counseling conducted by health cadres.

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# The Effect of Health Education about PJAS and PHBS on Students Grade V SDN 001 Sungai Kunjang, Samarinda

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## ABSTRACT

The level food safety of school (PJAS) and the low level of clean and healthy life style (PHBS) implementation in schools is a serious problem that needs more attention. Elementary school students are the largest group at risk of exposure to food and water contamination diseases. This study aims to determine the effect of health education on PJAS and PHBS on the knowledge and attitude of students of grade V in SDN 001 Sungai Kunjang. The research method used Pre Experimental with the design of One Group Pre-Post Test and interventions are provided through health education. The population in the study were all students of grade V with a total sample of 121 people taken use the purposive sampling method, with kriterian inclusions are students who are will be to follow the researched and present the researched conducted. Technique of collecting data using interview method and using research instrument in the form of questionnaire and data taken within one day. The results showed that respondents who are knowledgeable before the health education 12% and after was 56%. Respondents who had good attitude before the health education 92% and after was 95%. The result of statistical analysis with wilcoxon signed rank test showed significant influence with p-value = 0,000. Provision of health education was proved to significantly influence the knowledge and attitude about PJAS and PHBS on students of grade V SDN 001 Sungai Kunjang, Samarinda.

**Keywords:** Health Education, PJAS, PHBS, Students

## INTRODUCTION

School age children is an investment in the future of a nation, because they are the next generation of this nation-building. The nation's quality is determined by the quality of the kids at this point. Age group children in Indonesia are big enough that is 34% of the total population of Indonesia and consists of a group of elementary school age children by 5%.<sup>(1)</sup>

Time primary school children 7-12 years of age is that is the golden age for instilling the values of clean living and healthy behaviors (PHBS) in order to support healthy behaviors through health degrees early on. However, children often become the high-risk groups against certain diseases. One of the reasons

that is administering the nutrition and food intake while growing hibiscus children not done perfectly. As the use of dangerous substances, the lack of hygiene in the process of management of individual foods, not paying attention to the environment and also do not reflect the efforts of clean living and healthy behavior. Phatogenic bacterial transmit disease in food by 80%.<sup>(2)</sup>

The outbreak of food poisoned according to BPOM RI indicated that 30% of food poisoned incidents occur in educational institutions and of those 89% events happening in the elementary school (SD/MI).<sup>(3)</sup> The problem of the school cafeteria that has yet to apply the principles of Hygiene and behavior students who do not know about the behavior of living clean and healthy can also cause undesirable health effects. Based on data from the profile of East Kalimantan Health Office the year 2016, that diarrhea sufferers in Samarinda of 58%.<sup>(4)</sup> This to be vigilance regarding early threat of infections and cases of poisoning are transmitted through food especially on traditional school children. The condition must be anticipated by increasing healthy life patterns via safe PJAS and PHBS.

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Lestari’s et al. research (2015) in Madrasah Gonilan Surakarta showed there is the influence of education on healthy snacks to knowledge of students.<sup>(5)</sup> Kurniatilah’s research (2017) showed on SDN Taman kota Serang showed there is the influence of the CTPS to knowledge extension students.<sup>(6)</sup> However, there are limitations of earlier studies is just researched about PJAS or PHBS, but in this study examines about PJAS and PHBS simultaneously. So that this research was conducted to find out the influence of health education on awarding of PJAS and PHBS to knowledge and attitude of students of class V SDN 001 Sungai Kunjang, Samarinda, East Kalimantan, Indonesia. This research in addition to researched also produced output. The output in this researched is the formation of Healthy Student Ambassadors SDN 001 Sungai Kunjang provided training.

**METHOD**

This type of research is Pre Experimental with the design of One Group Pre-Post Test and interventions are provided through health education. Measurement of early (pre-test) before treatment (experimental treatment) and after treatment carried out measurement again (post-test). This research was carried out on SDN 001 Sungai Kunjang, Samarinda on April 30, 2018.

The population in this study were all V graders as many as 137 students and the total of samples of 121 students. Method of sampling used a purposive sampling technique, with inclusions criteria are: students who are will be to follow the researched and present the researched conducted. As well as the criteria of exclusion is students who are not present in the activities of the school. This study aims to determine the effect of health education on PJAS and PHBS on the knowledge and attitude of students of grade V in SDN 001 Sungai Kunjang.

The material of questionnaires were include about food safety of school and clean and healthy life behavior. Data collection techniques method interviews used a researched instrument in the form of questionnaires using scale model guttman and data taken within one day. If the question is answered correctly then it will be assigned a value of 1, and if one is given the value 0. So the total score for knowledge was 16 and total score for attitude is 15. The primary data used for analysis in univariate and bivariate and using the wilcoxon signed rank test with a 95% significance level ( $\alpha = 0.05$ ).

**RESULTS AND DISCUSSION**

**Table 1: Distribution of Respondents Characteristics**

No.	Characteristics	Frequency	%
1.	<b>Sex</b>		
	Male	67	55
	Female	54	45
2.	<b>Age</b>		
	10 years	31	25,6
	11 years	81	67
	12 years	8	6,6
	13 years	1	0,8
3.	<b>Class</b>		
	V B	29	24
	V C	29	24
	V D	30	25
	V E	33	27

Base on table 1 shows that the majority of respondents by male (55%), most 11 year old respondents (67%).

**Table 2: Variable Distribution of Respondents**

Variable	Category						Total	
	Good		Enough		Less		F	%
	F	%	F	%	F	%		
<b>Knowledge</b>								
Pre-test	14	12	97	80	10	8	121	100
Pos-test	68	56	53	43	1	1		
<b>Attitude</b>								
Pre-test	111	92	5	4	5	4	121	100
Pos-test	115	95	5	4	1	1		

On the basis of table 2 indicates that before given health education to students who had good knowledge of 14% and students who had less knowledge of 88%. After the given treatment to students who had good knowledge of 56% and students who had less knowledge of 1%.

Before treatment (given health education) to students who had good attitude of 92% and students who had attitude less by 4%. After treatment the students who had good attitude of 95% and the students who had attitude less of 1%.

**Table 3: The Results Of Statistical Test**

Variable	Mean	SD	Min-Max	P-value
<b>Knowledge</b>				
Pre-test	67,2	10,5	25,0-87,5	0,000
Post-test	78,4	10,2	4,7-100	
<b>Attitude</b>				
Pre-test	88,9	15,3	0-100	0,000
Post-test	92,9	11,7	0-100	

Based on table 3 average score of knowledge of respondents before the given health education is 67.2 with standard deviation 10.5. The highest score of respondents is 87.5 and the lowest score was 25.0. The average score of knowledge of respondents has given health education is 78.4 with standard deviation 10.2. The highest score of respondents is 100 and the lowest score was 4.7.

The average score of the attitude of the respondent before the given health education is 88.9 with standard deviation 15.3. The highest score of respondents is 100 and the lowest score was 0. The average score of the attitude of the respondent after the given health education was 92.9 with a standard deviation of 11.7. The highest score of respondents is 100 and the lowest score was 0.

The study has been finished to the respondent's knowledge there was significant differences before and after given health education. Before of health education majority of respondents knowledgeable enough and after given majority of good knowledgeable. It showed significant improvements before and after the given health education where respondents knowledgeable enough to become good knowledgeable.

This study is supported by Norimah & Rasidah's research (2017), the educational program had effect for increase significant for obese children's knowledge about healthy food.<sup>(7)</sup> Base on study by Tafti's research et al. (2018), there was significant increased of knowledge after intervention of educational program in the experimental group.<sup>(8)</sup>

Eskandari's research et al. (2017), after intervention of an educational program for the experimental group there was significant increased of knowledge, it proved by the mean scores of knowledge before and after intervention.<sup>(9)</sup> The study by Rosenkranz's et al. (2017) there were improved of knowledge after intervention nutrition education.<sup>(10)</sup> This study was supported by

Jadhav's research et al. (2014), there was improvement of knowledge after intervention and there was effect of health education on students's knowledge.<sup>(11)</sup>

This study was supported too by Ismail's research et al. (2018) there was a significant difference in knowledge of the respondent before and after the health education on the consumption of healthy snacks.<sup>(12)</sup> Through health education by administering medical or health information messages in the form of outreach to provide or enhance the knowledge on health.<sup>(13)</sup> A good level of knowledge can improve student behavior against the importance of the PJAS and PHBS so that in the future can support the PHBS behavior and good PJAS surroundings school.

Knowledge is the ability of a person to reveal what they knows through proof answer oral or writing that is stimulasi of the question. Knowledge is a component of common behaviors for adults. With the knowledge someone can consider to behave and act.<sup>(13)</sup>

Based on the results of the study showed the level of knowledge of respondents before and after health education with media power point average results obtained knowledge of the respondent increased after a given health education. Based on the results obtained there is increased knowledge of the respondent through the information provided in the form of health education through the medium of power point.

Power point is one medium that serves as a tool to present a material. Power point among other advantages: the material becomes more interesting because there's a game of colors, fonts and animation, the animated text or animated good pictures or photos. Message information visually easy to understand and more stimulating children to learn more information about the materials that are presented.<sup>(14)</sup>

Based on the results of the statistical tests are obtained that there is influence the given of health education to the level of respondents knowledge about the PJAS and PHBS. Given treatment of health education proved to be influential in improving the knowledge of the respondent this is evidenced through the score obtained by the respondent. After received health education, score of knowledge of respondents experienced an increase.

This research is supported by research conducted Korwa et al. (2018), that there is the influence of health education towards the level of knowledge about the

behavior of PHBS (healthy life) disposable hand wash SOAP before and after, in SD Negeri Tatelu Minahasa Regency North, evidenced with the change of knowledge before and after the given extension.<sup>(15)</sup>

The results of the research that has been conducted to the attitude of the respondent there was significant differences before and after health education the majority of respondents had good attitude, but an increase in the total of respondents who had good attitude. The existence of a given health education can change the attitude of the respondent, proved by the existence of difference in attitude for the better when getting health education about PJAS and PHBS.

Peyman's research et al. (2015), there was improvement student's attitude and knowledge after intervention and there was effect of health educational on attitude and knowledge students.<sup>(16)</sup> This study was supported too by Bisallah's research et al. (2018), there was significant increased for the intervention group on their attitude and knowledge, there was effect of health education intervention program to improvement attitude an knowledge.<sup>(17)</sup> Base on study by Yingklang et al, (2018), on the intervention group there was significant increased of attitude and knowledge and health education was effective to improvement students girl 's attitude and knowledge.<sup>(18)</sup>

This study was supported by Aini's research (2016) that the attitude of the respondent before the health education tend to be negative and, after treatment the attitude of students continues to rise and very respond good.<sup>(19)</sup>

Analestariastuti's reserach et al. (2014), showed the influence of health education on there students attitude, but there is no difference in the attitude of the students before and after the educational and health related diseases dengue fever. The research in contrast to the results of this study.<sup>(20)</sup>

Based on the results of the statistical tests showed that there is influence of health education on responde'ts' attitude about the level food safety of school (PJAS) and clean and healthy life behavior (PHBS). Giving treatment of health education affecting the change in attitude of respondents for the better. This is because the respondents have a good knowledge will show a good attitude as well. A person's attitude can affect the knowledge there had. Someone who is likely to be positive knowledgeable good compared with that of being negative.<sup>(21)</sup>

This study is supported by Ramadhani's et al. research (2016), that were a significant difference in differences in attitude of students before and after education about a balanced nutritious food and safe.<sup>(22)</sup> Mulyawati's et al. research (2017), that there is the effect of health education on students attitudes toward traditional security.<sup>(23)</sup>

## CONCLUSION

There is a difference in the level of knowledge and attitude of students of grade V about the level food safety of school (PJAS) and clean and healthy life behavior (PHBS) before and after given health education. Increased knowledge and attitudes for the better after a given health education. It proves a significant influence about health education in the improvement of knowledge and attitude about PJAS and PHBS in students grade V SDN 001 Sugai Kunjang, Samarinda, East Kalimantan.

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# Insights into Urban Informal Workers in Indonesia: Health Insurance Enrollment, Adverse Selection Issue and Access to Health Care

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## ABSTRACT

**Background:** The present study identified health insurance market penetration among urban informal workers with its challenges and their health seeking behavior. This study had been carried out in the district of Banyumas, Central Java, Indonesia.

**Method:** A multi-methods design by mixing both qualitative and quantitative studies had been applied.

**Results:** The present study identified the enrollment of urban informal workers in health insurance program was less than 3%. Challenges in expanding health insurance enrollment among urban informal workers were related to adverse selection, the need for specific premium collection, irregularity of income, and higher rate of failure to pay premium. In fact, urban informal workers who had been enrolled in national health insurance program had benefited accessing health care services compared to those who live in rural areas. The logistic regression results proved that informal workers who live in urban areas were statistically significant in hospital admissions.

**Conclusion:** Policy makers and marketers of health insurance policies should recognize a specific approach and intervention for extending enrollment to urban informal workers. Empowerment of social capital and networks among urban informal workers could be modified to support the effort of universal health insurance enrollment and enhance access to quality health services of such workers.

**Keywords:** *Informal workers, urban area, health insurance, adverse selection, access to health*

## INTRODUCTION

Informal workers account for the larger number of workers in urban areas in developing countries<sup>1,2</sup>. These workers often bear substantial risks and vulnerabilities as an effect of their activity and occupation settings<sup>3</sup>. In Indonesia, as the effort to achieve universal health coverage through the implementation of national health insurance, extending enrollment among such workers remains challenging to date<sup>4,5</sup>. This “missing middle” population in health insurance market needs a specific

concern with considering each group of informal worker’s characteristics<sup>4,6</sup>.

The challenges of expanding health insurance enrollment to informal workers in urban area is how to identify their unique preferences and behaviors<sup>6</sup>. The urban informal workers have better access to health care facilities compare to the rural population, however their specific characteristic may causing a slow increase in enrollment<sup>7</sup>. Moreover, substantial adverse selection problem of the informal workers membership in health insurance scheme also need to be encountered<sup>5</sup>.

The present study aimed to identify health insurance market penetration among urban informal workers with its challenges and their health seeking behavior. In doing so, we filled an important gap in knowledge as prior literature has not yet explored the situation of health insurance enrollment among informal workers in urban settings.

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**METHOD**

This study had been carried out in the district of Banyumas, Central Java, Indonesia. A multi-methods study design by mixing both quantitative and qualitative approaches had been applied. For the quantitative study, we selected 197 respondents from non-salary worker’s members of *BPJS Kesehatan* database who had arrears in premium payment. The independent variables consisted of information on sociodemographic factors (sex, household’s size, age, level of education, occupation), household economic and health status, while the dependent variable was inpatient utilization. The quantitative study focused on measuring the determinants of inpatient utilization among informal workers. All analyses were performed with SPSS statistical software.

For the qualitative study, we selected 8 informants from urban informal workers. By using phenomenology study design, this approach focused on exploring the experience of urban informal workers on having insurance, and the effort to prevent failure to pay for premium. For data analysis, we adopted thematic framework approach. To facilitate qualitative data, we performed with MAXQDA 11 qualitative software. The software assisted the researcher in conducting data sorting and coding to construct conceptual and thematic categories. Ethical approval was obtained prior to commencement of study and declared by the research ethics committee of the Faculty of Medicine, Jenderal Soedirman University, Indonesia.

**RESULTS AND DISCUSSIONS**

The results indicate that informal workers who were living in urban area increased the use of inpatient care in hospital (Table 1). Informal workers in urban area were less likely to have geographical barrier to access hospital service compare to those who lived in rural area. Urban informal workers could spend less transportation cost as well as accommodation costs for their carers. In developing country like Indonesia, geographic barrier may prevent people from accessing health services due to a higher marginal cost such as costs for transportation and accommodation <sup>8,9</sup>.

**Table 1: The determinants of inpatient utilization among informal workers**

No.	Variables	$\beta^a$	(se) <sup>a</sup>
1.	Female	1.367	0.394
2.	Household member > 4 persons	0.703	0.362

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<b>3.</b>	<b>Age composition (years):</b>		
	17–25	3.692*	0.727
	26–35	0.551	0.394
	36–45	1.150	0.522
	46–55	1.360	0.481
	55–65	1.232	0.883
	65 and above		
<b>4.</b>	Urban	1.961*	0.352
<b>5.</b>	<b>Occupational status:</b>		
	Farmer	0.000	1.140E4
	Trader	0.000	1.140E4
	Fisheries	0.506	4.180E4
	Entrepreneur	0.000	1.140E4
	Odd jobs	1.337	2.529E4
	Etc.	0.000	1.140E4
<b>6.</b>	Chronical illnesses	4.671***	0.337
<b>7.</b>	<b>Household income:</b>		
	Lowest 20%	0.804	0.517
	Lower 20%	1.751	0.426
	Middle 20%	1.746	0.428
	Higher 20%	0.941	0.528
<b>8.</b>	<b>Education:</b>		
	Lower level	1.452	0.719
	Middle level	1.514	0.367
	Constant	6.098E8	1.140E4

<sup>a</sup>The estimated parameters ( $\beta$ s) and asterisks indicate statistical significance at the 1% (\*\*\*), 5% (\*\*) and 10% (\*) level; <sup>b</sup>Robust standard errors in parentheses.

The study results also show an interesting phenomenon that informal worker who joining the insurance scheme was encouraged by their health status (Table 1). An adverse selection phenomenon was occurred in health insurance scheme in Indonesia. Although the membership of *BPJS Kesehatan* is mandatory, however in the initial stage of its implementation, the coercive characteristics of this scheme was less effective. This finding is in line with the previous published work in China that adverse selection became a problem for basic health insurance scheme in Wuhan when being extended to informal workers <sup>10</sup>.

The qualitative findings provide additional information regarding urban informal workers phenomenon on an increasing number of beneficiaries had arrears in health insurance premium payments, potentially encouraging to enrollment suspension. Irregularity of income and lower ability to health insurance premium might cause failure to pay for urban informal workers to sustain their payments. Moreover, government has implemented a regulation to

prevent the rears in premium payments. However, it needs an extensive campaign in order to educate the informal workers by considering their income characteristics. The introduction of the community partnership model by developing public-private mixed approach like Indian Rashtriya Swasthya Bima Yojana, RSBY, as healthcare financing mechanism for household workers in informal sector where government plays a role as a guarantor and supports premium subsidy may reinforce the sustainability of such workers to pay health insurance premium <sup>11</sup>.

The effort to extend health insurance enrollment among urban informal workers needs a specific concern and government policy to maintain the sustainability of the premium payments among the insured. The barriers of the extending health insurance among informal workers have been well documented <sup>4, 6, 10</sup>. Most of them have several problems related to the revenue of the premium, low awareness of health insurance mechanism and adverse selection. In urban settings, informal workers have better access to health facilities and social capital/networks that could support the effort to extend the enrollment to such workers as well as to assure the sustainability of the membership <sup>5</sup>. Therefore, government should recognize this opportunity through developing innovative marketing and tailored approaches as well as community empowerment as the effort to achieve universal coverage to such workers.

### CONCLUSIONS

Policy makers and marketers of health insurance policies should recognize a specific approach and intervention for extending enrollment to urban informal workers. Empowerment of social capital and networks among urban informal workers could be modified to support the effort of universal health insurance coverage and increase accessibility to quality health services of such workers. Future research needs to elaborate on innovative models that may be more effective at addressing the challenges in the efforts to extend the enrollment among informal workers particularly in urban areas.

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# Improvement of Water Quality after Implementation of Water Safety Plans (WSPs) in Semarang City, Indonesia

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## ABSTRACT

We implemented Water Safety Plans (WSPs) program at previous work due to poor of water quality in the coastal area of Semarang, Indonesia. The aimed of the research was to evaluate water quality before and after implementation of WSPs program in Bandarharjo village, Semarang city. This was an experimental design with steps for implementations of WSPs program adopted the guidelines and tools of the World Health Organization. Numbered 80 samples before and after implementation of WSPs and fulfilled by purposive sampling technique. The main parameters of drinking water were total coliform with MPN method, turbidity with turbidity meter, salinity and pH with potentiometer instrument. Data were analyzed using Wilcoxon match-paired signed-rank test at  $\alpha = 5\%$ . Bacteriological quality of drinking water in Bandarharjo village has increased 17.5% after implementation of WSPs program. There were significant difference between total coliform ( $p = 0.016$ ), salinity ( $p = 0.028$ ), and turbidity ( $p < 0.001$ ) before and after implementation of WSPs. Implementation of WSPs program has improved water quality, however regularly monitoring of the water supply system and bacteriological treatment are needed.

**Keywords:** *implementation of WSPs program, water supply system, drinking water, coastal area, water quality improvement.*

## INTRODUCTION

People in coastal area of Semarang, Indonesia used the deep ground water or artesian wells for daily needs (i.e., drinking, cooking, and washing). The number of deep ground water were not met the requirement in terms of bacteriological quality was 9 out of 20 water samples. Microbial contamination of major urban drinking water has the potential to cause outbreaks of waterborne disease.<sup>1</sup>

Our field risk assessment of water supply system in previous study in the coastal area revealed a very high degree of risk at source system, at a reservoir, at processing system, and at costumer or household system. We obtained a high degree of risk at distribution system.<sup>2</sup>

The water safety plans (WSPs) program implemented<sup>3</sup> in the coastal area of Semarang in accordance with the WHO guidelines.<sup>4</sup> The steps of WSPs program consist of introducing WSPs program, team building, training the team, examination of water safety before risk assessment, risk assessment, minor repair I, examination of water safety risk, minor repair II after monitoring.<sup>5</sup>

Introducing of WSPs program to the community conducted by presented the results of research related to water quality in the region to the representative community. The value of drinking water (i.e., reduce future water borne disease) also was informed. The team of WSPs was built and legalized by decree of village office. The WSPs

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team was well-trained using the materials adapted from the WHO training module.<sup>4</sup> Methods of training included presentation and discussion, simulation, field visit, and working group. Risk assessment and minor repairs were implemented in source system, distribution system, and household system.<sup>3</sup>

However, implementation of WSPs program has not been evaluated. Evaluation of the implementation of WSPs program could be evaluated due to the parameters of quality of the drinking water. The aim of the research is to evaluate the water quality before and after the implementation of Water Safety Plans (WSPs) program in the coastal area of Semarang.

## METHOD

**Study Design:** The location was in the Bandarharjo village, Semarang is chosen based on bacteriological water quality in the supply system. The samples numbered 40 out of 73 customers withdrawn by a purposive sampling technique. The parameters of drinking water are total coliform<sup>6-8</sup> with MPN method<sup>9</sup>, turbidity with turbidity meter, salinity, and pH with potentiometer.<sup>1,7,10,11</sup> The examination of drinking water quality was performed in the Local Health Laboratory of Central Java Province. Research activities used the framework of WSPs guidelines<sup>5</sup>, steps included: Introducing of WSPs to community by presentation and discussion method; WSPs team building and training by class, exercise and field visit method; examination of water safety before risk assessment by laboratory examination; risk assessment of water safety by WSPs team using tools of WHO; minor repair I: after risk assessment; examination of water safety risk after minor repair; monitoring of water safety risk; minor repair II: after monitoring of WSPs field trial in rob area.<sup>7</sup> This work used experimental with pretest and posttest design.<sup>12-14</sup>

In accordance with sample representativeness, it was being taken from locations that are representative of the points of use<sup>6</sup>. The time between sampling and analysis were kept to a minimum and it was storage in clean a glass or polyethylene bottles at a low temperature (4°C) in the dark sampler. Acidify (pH) and turbidity of water was tested immediately after sampling to prevent change during storage and transport<sup>6</sup>.

## STATISTICAL ANALYSIS

Description of data conducted by compared water quality before and after of the WSPs implementation.

Kolmogorov-Smirnov was performed to analyze normality of data (MPN coliform, turbidity, pH, and salinity). Wilcoxon match-paired test was performed to analyze the quality of drinking water before and after implementation of WSPs program at  $\alpha = 0.05$ <sup>15</sup>. All statistical analyses were performed using SPSS statistical software version 20.0 (IBM™ Corp.).

## RESULTS AND DISCUSSIONS

Table 1, in term of pH and salinity, all water sample qualify the standard, yet two of 40 samples exceed turbidity standard (> 25 mg/l). Eighty percent of water sample at customer level did not meet specified standard according to Decree of Ministry Health of Republic of Indonesia number 416/1990, which is maximum 10/100 ml water sample. Water quality does not require BOD parameter. The BOD examination was performed to estimate a possibility of piping leakage, loose connections, or water contamination by sewer or tidal inundation, also possibility sedimentation in inner pipe. In addition, from the results of our spot check by cutting distribution pipeline, we found in the inner wall of the pipe has a lot of stick impurity deposition.

On physical examination at household level of deep ground water, the turbidity levels before the repair were found in two samples of 40 samples tested, that did not qualify at more than 25 mg/liter. However, the physical examination of the water quality parameters of turbidity after the improvement of drinking water supply system, it is no longer found turbidity levels that exceed the requirements of Ministry of Health regulation number 416/1990.

Bacteriological quality of the water in the deep ground well at customers level is qualified according to Ministry of Health regulation number 416/1990 as much as 13 (32.5%) of the 40 samples tested (same sample before risk assessment). While the quality of deep ground well on customers who do not qualify the requirements as much as 27 (67.5%) of the 40 samples tested. Bacteriological quality of water that met the requirements have increased 17.5%, from 6 (15%) to 13 (32.5%). The most bacteriological quality of the water samples examined (67.5%) remained not met its specified requirements.

As a conclusion, test results of water quality parameters of physics, chemistry, and biology at the consumer level after the improvement of drinking

water supply as follow (Table 1): (a) Physical quality parameters of turbidity of water with as many as 40 samples (100%) were eligible; (b) Bacteriological quality (total coliform) from deep ground well water to customers who still have not qualified as much as 27 (67.5%) of the 40 samples examined; (c) Parameters pH and salinity and BOD all (100%) were eligible.

**Table 1: The category of standard of water quality before and after minor repairs of implementation of the WSPs program**

Water parameters	Before (n = 40)	After (n = 40)
<b>MPN coliform</b>		
Met standard	17.5	32.5
Not met standard	82.5	67.5
<b>Turbidity (NTU)</b>		
Met standard	95	100
Not met standard	5	0

**Table 2: The water quality before and after minor repairs of implementation of WSPs program**

Water parameters	Before (n=40)			After (n=40)			p-value	Remark*
	Mean ± SD	Min.	Max.	Mean ± SD	Min.	Max.		
MPN coliform	740.2 ± 1012	3	2400	273.93 ± 641.3	3	2400	0.016	Not met standard
Turbidity (NTU)	4.28 ± 11.5	0.18	65.9	0.26 ± 0.23	0.02	1.34	<0.001	Met standard
Salinity (mg/L)	0.12 ± 0.09	0.018	0.66	0.24 ± 0.15	0.04	0.4	0.028	
pH	7.0 ± 0	7.0	7.0	7.0 ± 0	7.0	7.0	-	Met standard
BOD (mg/L)	0.45 ± 0.5	0.1	2.91	0.42 ± 0.22	0.1	0.94	0.697	-

\*According Ministry of Health of Republic of Indonesia 416/1990

The local government drinking water supply system consists of intake of raw water, physical and chemical treatment, distribution and household connection. Complete water treatment included screening, coagulation, sedimentation, filtration, disinfection, and distribution.<sup>16</sup> However, the minimum requirement for ground water is disinfection. One way to disinfect water is using chlorine. An effective disinfection using chlorine kills bacteria, viruses, and protozoa such as Giardia and Cryptosporidium.<sup>1</sup>

Coliform bacteria is an intestinal bacteria leaves in human digestion tract, has a pathogenic capacity which used to be an indicator of sanitation. The most widely used in drinking water indicators are coliforms

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<b>Salinity (mg/L)</b>		
Met standard	100	100
No met standard	0	0
<b>pH</b>		
Met standard	100	100
Not met standard	0	0
<b>BOD (mg/L)</b>		
Met standard	100	100
Not met standard		

\*According Ministry of Health of Republic of Indonesia 416/1990

Table 2 showed the statistical analysis of parameters of the water quality before and after minor repairs of implementation of the WSPs program in Bandarharjo village. The average level of the MPN coliform, turbidity, and salinity were significant difference before and after implementation of WSPs program (p=0.016, p<0.001, and p=0.0028). There were no difference between pH and BOD before and after implementation of WSPs program (p=-, p=0.697).

(total coliforms), fecal or thermo tolerant coliforms, Escherichia coli, enterococci (fecal streptococci or intestinal enterococci) and bacteriophages.<sup>17</sup>The presence of fecal coliform, which counted by a number of colonies, is positively correlated with the presence of pathogenic bacteria. In addition, the detection of the coliform is cheaper, faster, and simpler than detection of other pathogenic bacteria method. Therefore, a coliform determination could be used as an indicator of water quality. Although E. coli is a part of the normal microbial digestive tract, the presence of certain strains could cause moderate to severe gastroenteritis level in humans and animals. Feces can be a source of pathogenic bacteria, viruses, protozoa, and helminth.<sup>7</sup> The presence of coliforms in the distribution system,

while possibly due to inadequate treatment, could also be due to cross-connections or failure to maintain an adequate disinfectant residual.<sup>18</sup>

Water supply system in Bandarharjo village mostly relies on deep ground wells. The water has undertaken neither physical nor chemical treatment processing to secure water quality and safety. Disinfection is an effective barrier to many pathogens (especially bacteria) during drinking-water treatment and should be used for surface waters and for groundwater subject to fecal contamination.<sup>7</sup>

The average number of MPN coliform before and after implementation of WSPs program remain not met the standard in accordance with Ministry of Health of Indonesia number 406/1990 (Table 2). Although the average number of MPN coliform significantly decreased before and after implementation of WSPs program ( $p = 0.016$ ). This probably because the minor repair of the water system that only focused on the improvement of physical infrastructure to prevent contamination, rather than chemical aspects. Chemical treatment such as water disinfection had not been done due to community rejection. Thus the bacteria remain contaminated water from the source and distributed to costumers. Although at water source the bacteriological quality actually improved, the improvement was not significant in accordance with a standard. A recent study revealed groundwater to be vulnerable to contamination both in the vulnerable and critical zones in the north and the east of Semarang. This groundwater was unsuitable for drinking water due to seawater intrusion in the damage area.<sup>19</sup>

The presence of microbial may also influence by organic materials<sup>20</sup> deposition in the inner of type pipe<sup>21</sup> in distribution and the process included three stages.<sup>22</sup> It was indicated the presence of BOD, although in a small amount. The BOD level was lower after WSPs program implemented even it was not statistically significant. The pipe deposition may cause of microbial growth.<sup>23</sup> Several studies have demonstrated presence of coliforms in drinking water distribution systems associated with biofilm growth problems.<sup>24,25</sup>

The salinity of drinking water was very low, despite the increase in salinity after minor repair of the water supply system. The water salinity level met the requirement in accordance with the quality of drinking water. Biofilm growth is influenced by a number of

physical, chemical, and biological processes. The level of acidifying (pH) of water was 7 (in neutral pH) and its good chemical condition for growing microbial in the water.<sup>22</sup> There was no significant difference (constant) of pH before and after implementation of WSPs program. There was no treatment process in the water supply system, a primarily addition of the chemical agent. So the pH remained constant in average.<sup>26</sup> The pH is an important operational water quality parameter, for effective disinfection with chlorine, the pH should preferably be 6-8, because chlorination may be ineffective above pH 9.<sup>7</sup>

Turbidity was met a standard and significantly reduced in average (difference) before and after implementation of WSPs program ( $p < 0.001$ ). Water supply system: at the source (i.e., cisterns, pipe, and cisterns cover), at distribution pipe (i.e., leakage pipe, lost connection, flushing), and at customer connection (i.e., water meter, connection pipe) were improved. Turbidity correlates with changes of suspended bacterial concentration<sup>21</sup> and adversely affects the efficiency of disinfection.<sup>7</sup> As the turbidity decreased, the number of MPN also showed a significant decrease.

## CONCLUSIONS

The bacteriological quality of water supply system in Bandarharjo village increased 17.5% after implementation of WSPs program. The implementation of WSPs program is able to improve the quality of drinking water and can be replicated. However need continuous assistance and improvement particularly to maintain the team, disinfection process using acceptable method, periodically flushing, and monitoring drinking water supply system.

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# Social-Ecological Risk Determinant and Prediction For Dengue Transmission

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## ABSTRACT

**Background:** Dengue hemorrhagic fever is a serious health problem in Medan, with high incidence annually. Social and ecological factors are play role on dengue transmission.

**Purpose:** The aims of study to determine the impact of social and ecological factors on dengue transmission and made a prediction model for dengue transmission.

**Method:** This study was a cross sectional study with 100 households both in high and low subdistricts dengue incidence that were selected using systematic random sampling. Of the 100 households, larvae examination was performed. Data analysis was performed using simple and multiple logistic regressions.

**Results:** The results revealed that houses without window screen, frequency of cleaning of garbage dump more than 7 days and presence of larvae positive container had roles on dengue transmission in Medan with the equation of prediction model for dengue transmission =  $2.343 + (-2.025 \times \text{houses without window screen}) + (1.876 \times \text{frequence of cleaning garbage dump more than 7 days}) + (1.549 \times \text{presence of larvae positive container})$ .

**Conclusions:** social and ecological factors are related to dengue transmission in Medan. Health promotion about dengue prevention is essential and should be intensified to improve dengue preventive measures.

**Keywords:** social-ecological, risk, prediction, dengue transmission.

## INTRODUCTION

Dengue hemorrhagic fever (DHF) is health problem in many tropical and subtropical countries worldwide. Presently, more than 100 countries are endemic for dengue virus infection with 390 million dengue infection occur annually<sup>1</sup>. It was estimated that about 3.9 billion people live in 128 countries high-risk areas for dengue infection<sup>2</sup>. World Health Organization (WHO) noted Indonesia as the country with the highest dengue cases in Southeast Asia. Among 34 provinces, North Sumatera Province is endemic area for DHF cases di Indonesia

with Medan is the highest for DHF cases in North Sumatera Province<sup>3</sup>.

The factors responsible for DHF incidence are complex. Social factors as well as ecological factors play role on dengue transmission. Social factors such as poverty, illiteracy, household density, and cultural practices affect the abundance of *Aedes aegypti* mosquitoes. In addition, environmental factors such as environmental and housing conditions with poor hygiene conditions can create potential breeding sites. Moreover prolonged storage of water for domestic could also create breeding place for *Aedes aegypti*, thereby increasing dengue transmission<sup>4,5</sup>. A study in Southern Brazil by Thammapalo *et al.* (2008) found brick houses and houses with poor garbage disposal are at higher risk for contracting DHF<sup>6</sup>. Another study by Spiegel *et al.* (2007) found that social and environmental factors are associated with the presence of *Aedes aegypti* and thereby have a higher risk for DHF<sup>7</sup>.

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Public awareness about dengue and prevention measures are essential in dengue prevention and control. Many studies investigate the knowledge, attitudes and practices concerning dengue in communities. A study by Shuaib *et al.* (2010) concluded that appropriate knowledge does not always lead to effective practices<sup>8</sup>. Contrary with Al-Dubai study *et al.* (2013) found that knowledge regarding dengue is associated with effective practices for dengue prevention<sup>9</sup>.

DHF is a health problem in Medan. Many prevention efforts have been conducted, however the incidence of DHF remains high. For effective control measures, efforts should be focused on the disease risk factors, particularly social and ecological factors. Therefore, this study was designed to identify the social and ecological risk determinants of dengue transmission.

## METHOD

This study was conducted in Medan, a district with high DHF incidence in North Sumatera from 20th August, 2016 to 28th September, 2016. In this study, the larval survey was done based on WHO procedure by inspection of containers both indoor and outdoor in selected houses to examine *Aedes larvae* as shown in Figure 1 and then house index (HI) was calculated.



Fig. 1: Activity in larva survey

**Sample:** In this study, two subdistricts with high DHF incidence (Selayang, Tuntungan) and two subdistricts with low DHF incidence (Denai, Medan area) were purposively selected based on the incidence of DHF. From the high subdistrict, households were systematically selected among the households with reported cases from the health office registry, whereas in the low subdistrict, households were systematically selected based on the registry of the household from the sub-district administrative office.

**Sample size:** Sample size was calculated using the two-proportion formula<sup>10</sup>, with an average Odds Ratio (OR) of 3.45. Proportion of low education in cases group (P1) of 0.49 and proportion of low education in control group (P0) of 0.22<sup>11</sup>. An allowable error of 5% and a power of study of 80%. The sample size was 48. Therefore, 100 households for subdistrict with both high and low DHF cases were included in this study.

**Study instrument:** The sociocultural data, knowledge as well as environmental condition were collected by interview and check list and then recorded using questionnaires that were developed based on questionnaires published research<sup>12,13</sup>. The socio-cultural factors included education level, knowledge, hanging clothes, frequency cleaning of water container and frequency cleaning of garbage dump. Environmental factors included house construction, window screen and house with positive container. Knowledge was assessed via eighteen questions regarding cause, symptoms, mode of transmission, breeding place and prevention. These questions could be answered with yes (scoring 1 point) and no or do not know (scoring 0 points). Knowledge was classified as good when 75% or more of the answers were correct and low when less than 75% of the answers were correct.

## STUDY ANALYSIS

The Statistical Package for Social Science (SPSS) program Release 22.0 was used for data analysis. House indices were calculated and tabulated for descriptive statistics. Simple and multiple logistic regressions were used to analyze the association between social and ecological factors with dengue transmission

## RESULTS AND DISCUSSION

A total of 100 samples were included in this study consisted of 100 households both in high and low subdistricts dengue cases. The majority of respondent in high subdistrict have low educational level (48.0%) and poor knowledge (60.0%). Habits that promote *Aedes aegypti* breeding, such as hang-drying clothes, cleaning water container more than 7 days, garbage disposal more than 7 days were found to be 88.0, 34.0, 48.0%, respectively (Table 1).

**Table 1: Socio-cultural profile of respondents (n = 100)**

Socio-cultural factor	High subdistrict n (%)	Low subdistrict n (%)
<b>Education level</b>		
High	26 (52.0)	36(72.0)
Low	24 (48.0)	14 (28.0)
<b>Knowledge</b>		
Good	20 (40.0)	31 (62.0)
Poor	30 (60.0)	19 (38.0)
<b>Hanging clothes</b>		
No	6 (12.0)	9 (18.0)
Yes	44 (88.0)	41 (82.0)
<b>Frequency cleaning of water container</b>		
≤ 7 days	33 (66.0)	39 (78.0)
> 7 days	17 (34.0)	11 (22.0)
<b>Frequency cleaning of garbage dump</b>		
≤ 7 days	26 (52.0)	38 (76.0)
> 7 days	24 (48.0)	12 (24.0)

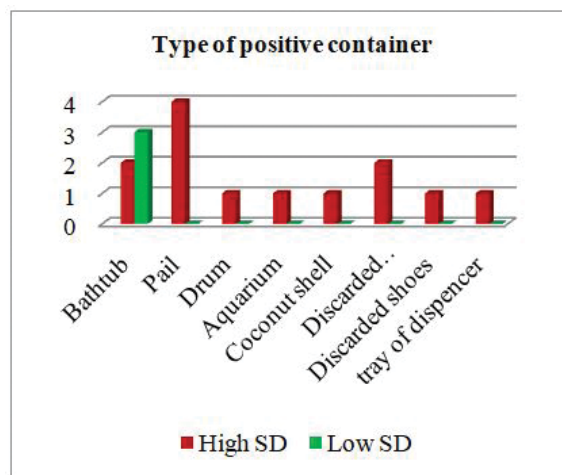
Concrete houses were the most common house (50.0%) in high subdistrict. Of the 50 houses, 44% houses without window screen. Moreover, houses with positive container in high subdistrict are more found than low subdistrict with houses indices 22.0% versus 6.0% (Table 2). Of the type positive container both high and low subdistrict, there were eight type of positive container in high subdistrict, while only one type in low subdistrict as presented in Figure 2. While for houses with positive container in high subdistrict is more than low subdistrict, thereby house indices for *Aedes* in high subdistrict compared to low subdistrict are 22 % versus 6 % as presented in Figure 3.

Of the simple logistic regression showed that education level, knowledge, frequency cleaning of water container, frequency cleaning of garbage dump, houses without window screen and presence of positive container were significant variables that indicated with *p value* less than 0.25 (Table 3) . Then these variables were included in in the multiple logistic regression and with the enter method, three significant variables contribute to dengue transmission such as houses without window screen, frequency cleaning of garbage dump more than 7 days and presence of positive container. Then three significant variables put into fix model to produce equation for prediction model for dengue transmission is 2.343

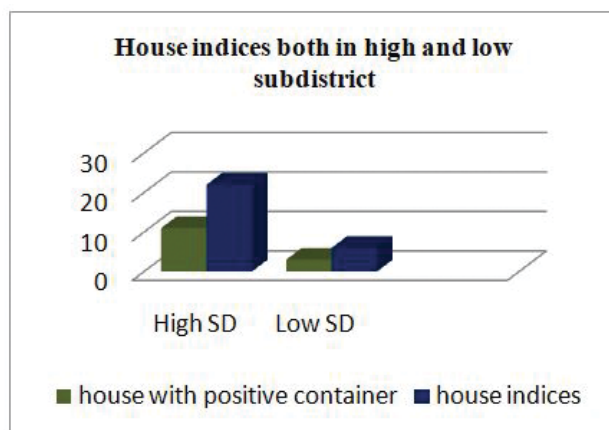
$+(-2.025 \times \text{houses without window screen}) + (1.876 \times \text{frequency cleaning of garbage dump more than 7 days}) + (1.549 \times \text{presence of water container})$  as shown in Table 4.

**Table 2: Environmental characteristic of respondents (n = 100)**

Environmental variable	High subdistrict n(%)	Low subdistrict n(%)
<b>Houses construction</b>		
Wood	5 (10.0)	2 (4.0)
Brick	18 (36.0)	31 (62.0)
Concrete	15 (50.0)	14 (28.0)
Mixed	2 (4.0)	3 (6.0)
<b>Window screen</b>		
Yes	28 (56.0)	13 (26.0)
No	22 (44.0)	37 (74.0)
<b>Positive container</b>		
Yes	11 (22.0)	3 (6.0)
No	39 (78.0)	47 (94.0)



**Fig. 2: Type of positive container**



**Fig. 3: House indices in high and low subdistrict**

**Table 3: Factors associated with dengue transmission using Simple Logistic Regression**

Variabel	Crude OR 95 % CI	p value
<b>Education level</b>		
High	2.37	0.031
Low	(1.04; 5.44)	
<b>Knowledge</b>		
Good	2.45	0.029
Poor	(1.09; 5.49)	
<b>Hanging clothes</b>		
No	1.61	0.401
Yes	(0.53;4.92)	
<b>Frequency cleaning of water container</b>		
≤ 7 days	1.83	0.181
> 7 days	(0.75; 4.44)	
<b>Frequency cleaning of garbage dump</b>		
≤ 7 days	2.93	0.014
> 7 days	(1.25; 6.87)	
<b>House construction</b>		
Wood		0.390
Brick		
Concrete	1.28	
Mixed	(0.73 ; 2.27)	
<b>Window screen</b>		
Yes	3.62	0.003
No	(1.36; 8.40)	
<b>Positive container</b>		
Yes	4.33	0.033
No	(1.13; 16.62)	

Waste management was associated with dengue transmission. As known that the solid waste of plastic bottles, disposed of carelessly can be a breeding place for the vector of dengue fever and thereby could increase the incidence of dengue hemorrhagic fever. In this study the frequency of garbage dump was associated with dengue transmission. This finding is consistent with Thammapalo study *et al.* (2008) the cities of Songkhla and Suwannapong *et al.* (2014) in Thailand. They found that poor garbage disposal contributed to dengue transmission<sup>6,14</sup>. Likewise, Cordeiro *et al.* (2011) study in South East Brazil found that low frequency of garbage collection was associated with an increase in the incidence of DHF<sup>15</sup>.

Window screen have been promoted for use to prevent mosquitoes entering the house therefore,

preventing contact with *Aedes* mosquitoes. In this study, houses without window screen was associated with dengue transmission. This findings was supported by Norli & Azmi (2008) study in Johor Bahru and Koyadun study *et al.* (2012) in Thailand found that houses without window screen contributed to DHF incidence<sup>16,17</sup>.

**Table 4: Factors associated with dengue transmission using Multiple Logistic Regression**

Variabel	β	Crude OR 95 % CI	p value
<b>Frequency cleaning of garbage dump</b>			
≤ 7 days		6.53	0.001
> 7 days	1.87	(2.12; 20.06)	
<b>Window screen</b>			
Yes		7.57	0.000
No	-2.025	(2.53 ; 21.72)	
<b>Positive container</b>			
Yes		4.71	0.027
No	1.549	(1.19 ; 18.62)	
Constant	2.343		

The presence of container positive for larvae would allow mosquito to breed and increase the mosquito population and risk for dengue transmission. In the current study, number of containers positive for *Aedes* larvae were more in the high subdistrict compared to low subdistrict. This related to high incidence in the subdistrict. This findings was consistent to Phuong *et al.* (2008) in a study in Binh Thuan Province, found that positive water container for *Aedes* larvae was associated with high incidence of dengue fever in Binh Thuan Province<sup>18</sup>.

Bathtub was one of the important breeding places for *Aedes* mosquitoes. Bathtub made of cement and brick was preferred by *Aedes* for eggs attachment. Most people keep water in the bathtub to take a bath and cleaned up more than two weeks or even once a month. This could be a potential breeding place for *Aedes* and high risk for dengue transmission. In this study, bathtub was the commonest container positive for *Aedes* larvae both in high and low subdistrict. This finding was consistent to the findings by Yotopranoto *et al.* (2010) in Nginden district and found that traditionally bathtub was the potential container for *Aedes* larvae inside the house<sup>19</sup>.

Vector density as well as breeding places are the

important for effective vector control. larval indices was significantly associated with DHF transmission. Health Ministry of Indonesia and The Pan American Health Organization used HI as an indicator for dengue transmission. In this study, house indices (HI) in high subdistrict was more than low subdistrict (22% versus 6%). Therefore, HI in the high subdistrict was more than 10. It indicates that this subdistrict has a high risk of DHF transmission<sup>20</sup>.

In this study we found that prediction model for dengue transmission is  $2.343 + (-2.025 \times \text{houses without window screen}) + (1.876 \times \text{frequency cleaning of garbage dump}) + (1.549 \times \text{presence of water container})$ . From this equation can be interpreted that one point added in house without window screen will increase risk of dengue transmission is 7.57 times compared to houses with window screen. The increased of one point in frequency cleaning of garbage dump more than 7 days will increase 6.53 times risk of dengue transmission compared to frequency cleaning of garbage dump less than or 7 days. Likewise, for positive water container one point added in presence of water container probably increase 4.71 risk of dengue transmission compared to absence of water container. Thus, houses without window screen, frequency cleaning of garbage dump more than 7 days and presence of water container are predictor dengue transmission

### CONCLUSION

Our study revealed that social and ecological factors are associated with dengue transmission. House without window screen, frequency cleaning of garbage dump more than 7 days and presence of larvae positive container are predictor for dengue transmission.

For effective control measures, effort was focused on the risk factors, specifically on social and ecological factors. Therefore, health promotion about dengue prevention is essential to improve dengue preventive measures.

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**Conflict of Interest:** No conflict interest involved in this study.

**Ethical Clearance:** Before the study was conducted, human subject approval was obtained from The University of North Sumatera on 19 August 19, 2016. The study was approved by the Research and Ethics Committee, School of Nursing, University of North Sumatera (Reference code number 1207/VIII/SP/2016).

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# Determinants of Plumbun Level in Blood among Elementary School Students in Cinangka, Bogor

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## ABSTRACT

Plumbun is one of toxic heavy metal that can decrease hemoglobin and IQ, affect the digestive, cardiovascular and reproduction system. In Cinangka Village (Bogor), plumbun pollution on the ground reached 270,000 ppm (WHO threshold = 400 ppm). The purpose of this study was to analyze the determinant factors of plumbun level in blood among elementary school students in Cinangka. This research was an analytic survey with cross sectional design. To measure plumbun, blood samples were taken from 103 students in Cinangka (2014). Independent variables consist of location of residence, parent's education, nutrient intake were known by using questionnaire. The measurement of nutritional status was known by calculating Body Mass Index. Statistical analysis with Mann-whitney test showed there was mean difference in plumbun level between students who living in Cinangka villages and outside Cinangka Village ( $p=0.004$ ). For mother's education, there was mean difference in plumbun level between students who had mother with low education and high education ( $p=0.032$ ). There was not mean difference in plumbun level for father's education ( $p=0.250$ ) and nutritional status variable ( $p=0.145$ ). Rank spearmen correlation test showed there was correlation between intake of potassium ( $p=0.05$ ; correlation coefficient=-0.191), calcium ( $p=0.05$ ; correlation coefficient=-0.192) and zinc ( $p=0.05$ ; correlation coefficient=-0.194). There was not correlation between intake of iron ( $p=0,107$ ) and protein ( $p=0.080$ ) with plumbun. Determinant factors of plumbun level in this study were location of residence, mother's education, intake of potassium, calcium and zinc. Variable of father's education, nutritional status, iron and protein intake were not determinant factors of plumbun level.

**Keywords:** *Determinant factors, blood lead levels, students*

## INTRODUCTION

Heavy metal pollution is becoming a serious issue in developing countries<sup>[1]</sup>. Plumbun is one of heavy metal that can pollute the air. The first effect on chronic plumbun poisoning before it reaches the target organ is the presence of disturbances in the biosynthesis of the hem, and if the disorder is not resolved soon it can lead to disruption to various organ systems such as the

nervous system (IQ level), kidneys, reproductive system, gastrointestinal tract and anemia<sup>[2]</sup>.

Although today some countries have made policies to remove plumbun from gasoline, but plumbun exposure at the population level in some areas, especially in developing countries remains high. Mean of plumbun level in China were reported 13  $\mu\text{g}/\text{dl}$ <sup>[3]</sup>, 15  $\mu\text{g}/\text{dl}$  in the urban populations in Bangladesh<sup>[4]</sup>, and 11  $\mu\text{g}/\text{dl}$  in urban children in India<sup>[5]</sup>. Plumbun level in 50 children aged 3 months to 19 years involved in the WHO investigation ranged from 39.8-613.9  $\mu\text{g}/\text{dl}$ , with mean of 129.5  $\mu\text{g}/\text{dl}$  (SDs of 92.4  $\mu\text{g}/\text{dl}$ )<sup>[6]</sup>. In contrast, in developed countries, such as the United States, reported that the mean of plumbun level in children's blood 1.9  $\mu\text{g}/\text{dl}$ <sup>[7]</sup>.

Since March-April 2010 there has been an outbreak of plumbun poisoning in the Zamfara region of Nigeria.

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Investigation involving WHO confirmed that severe plumbun poisoning occurred in more than 100 children in Dareta and Yargalma Villages, with a mean of plumbun level in the blood's children of 119 µg/dl [8].

The research was done by Cao (2014) in China showed the arithmetic mean, geometric mean and median of plumbun levels of 0- to 6-year-old children from Shanghai were 22.49 mg/L, 19.65 mg/L and 19.5 mg/L, including 0.26% (6/2291) with concentrations >100 mg/L and 2.7% (61/2291) with concentrations >50 mg/L. Boys' levels (23.57 mg/L) were greater than those of girls (21.2 mg/L). The plumbun levels increased with age. Risk factors for plumbun contamination included housing environment, parents' education levels, social status, hobbies, and children's nutritional status[9].

Today the battery recycling industry is an important source of plumbun pollutants today. Plumbun is used in industries derived from mined ore (primary) or from battery recycling (secondary)[10].

The Ministry of Environment, Indonesia informed that plumbun pollution is still a problem in Jakarta, Bogor, Depok and Tangerang (Jabodetabek). This indicates that air pollution by plumbun comes from other sources rather than gasoline. began conducting an environmental investigation in 2001 and then resulted in findings in 2005. Early indications indicate that the source of high air pollution by plumbun in Jabodetabek area is due to the battery smelting industries in the various regions. Furthermore, the findings indicate that Tangerang City, Tangerang Regency and Bogor Regency have higher number of battery smelting industries.

Based on the report of The Leaded Gasoline Elimination Committee in 2011, plumbun level in children's blood in the battery smelting area in Tangerang and Bogor quite disturbing. Cinangka is one of the areas in Bogor District that has battery smelting industry and became a polluted place by plumbun since the 1980s. In Cinangka Village, plumbun pollution on the ground reached 270,000 ppm, whereas the WHO threshold is 400 ppm. It can be seen that plumbun pollution based on these results indicates that the quality of the environment is bad enough and contains great harm to human health and other life. The purpose of this study was to analyze the determinant factors of plumbun level in blood among elementary school students in Cinangka.

**METHOD**

A cross sectional study was conducted during May-June 2014. This study used questionnaire to collect data on the variables of location of residence and parent's education level by doing interview. Variable of nutrient intake was known by using food recall 2x24 hour form/questionnaire. Each participants asked to fill food recall 2x24 hour form. Variable of nutrient intake consist of intake of iron, protein, zinc, calcium and potassium. The measurement of nutritional status was known by calculating Body Mass Index and converted into Z-score value. The Body Mass Index (BMI) was calculated as weight in kilograms divided by height in square meters (kg/m<sup>2</sup>). Data on plumbun level as dependent variable, was collected by measuring 3 ml venous blood from the arm of participants. Blood specimens were taken by 3 medical personnel from Puskesmas Cilandak, South Jakarta and Jati Rahayu Hospital. The measurement of plumbun level conducted in the Hiperkes laboratory Jakarta, using AAS (atomic absorption spectrophotometer).

Population was the elementary school student in Cinangka Village (Bogor District) grade 4, 5, and 6 with total population 535 students. Simple random sampling method was used to recruit elementary school students in Cinangka. Initially 103 students who met the study's inclusion criteria and approved informed consent, invited to participate in this study.

Variable of location of residence, parent's education level and nutritional status, divided into 2 categories or groups. The Mann-Whitney test was statistical analysis test to analyze whether there was a difference of plumbun level in the 2 categories of each variable. Data analysis using rank spearman correlation test was done to know the correlation of nutrient intake variable (iron, protein, zinc, calcium, potassium) with plumbun level.

**RESULTS AND DISCUSSIONS**

The description of plumbun level in blood as the dependent variable in this study was shown by tables 1 and 2.

**Table 1: Description of Plumbun Level in Students**

Variable	Mean	Median	SD	Min	Max
Plumbun level	14.70	14.01	11.95	0.05	52.11

**Table 2: Distribution of Plumbun Level Category Based on CDC Treshold**

Variable	F	%
<b>Plumbun level</b>		
≥ 5 µg/dl	79	76.7
< 5 µg/dl	26	23.3

WHO has determined that the threshold value for plumbun level in blood was 10 µg/dl, whereas the CDC has set a threshold level of plumbun level of 5 µg/dl<sup>[11]</sup>. Based on the results of the analysis, of 103 respondents found that the mean of plumbun level in their blood was 14,70 µg/dl, so that greater than WHO and CDC threshold values. The highest plumbun level of 52.11 µg/dl were found in a boy aged 12.17 years in grade 6 SD. Plumbun levels are grouped into 2 categories based on CDC cut off point of 5 µg/dl. As many as 76.7% of respondents were known to had plumbun levels in blood ≥ 5 µg/dl.

Dhimal (2017) from Nepal reported that, found 64.4% of the children in his research had plumbun level in blood exceeding the CDC cut-off point of 5 µg/dl indicating a serious public health importance. Although no child had a plumbun level >45 µg/dl, which would have required chelation therapy as per CDC guideline<sup>[12]</sup>.

The results of this study indicate that children living in Cinangka Village and children living outside Cinangka Village had different mean of plumbun levels. It was known that Cinangka is one of the areas in Bogor District which has battery smelting industries and become a place polluted by lead. In the 1980s, Cinangka Village became the center for battery smelting industries. In fact, the battery melting into a home-based industry. In the middle of the settlement, residents burned tin without chimneys and filters of emissions to cause polluted air and the sky covered with black fog. In Cinangka Village, lead pollution on the ground reaches thousands or even hundreds of thousands of ppm, whereas WHO threshold is 400 ppm.

Researchers believe that such conditions lead to environmental contamination in Cinangka Village due to plumbun exposure derived from the battery recycling (recycling) industry that has been ongoing since the 1980s. The presence of lead contamination in the environment caused children living in Cinangka Village had mean of plumbun level, higher than children living outside Cinangka Village.

This study had a similar result with a study by Clune et al (2011). Clune tried to create a global map of plumbun level in blood in children, by reviewing 120 scientific publication data representing a total of 62,275 children, of which the sample came from 242 different populations. Of the 242 populations, as many as 57 populations (24%) can be formed a hotspot or points of the area contained plumbun pollution. 57 hotspots representing 8,345 children. It was known that 9 hotspots had mean of plumbun level in blood ≥ 20 µg / dl, and the most commonly presumed major source of hotspots were melting and casting, recycled batteries and pottery-glazed pottery. 3 hotspots had mean of plumbun level in blood ≥ 40 µg/dl, and this is related to the production of lead-glazed pottery in La Victoria, Ecuador (mean=40 µg/dl), 15 batteries recycling in Manila, Philippines (mean=49.9 µg/dl), 16 hotspots of metal disassembly in Mumbai, India (geometric mean 69.2 µg/dl)<sup>[13]</sup>.

**Table 3: Description of Nutrient Intake in Student**

Variable	Mean	Min	Max	P value	r
Iron intake	4.82	0.4	21,5	0.107	-0.160
Protein intake	30.71	4.2	76.8	0.08	-0.174
Zinc intake	3.43	0.50	10.30	0.05	-0.194
Calcium intake	280.97	11.0	1638,6	0.05	-0.192
Potassium intake	659.23	47.5	2450.6	0.05	-0.191

The result of univariate analysis showed that from 103 respondents it was known that the mean of iron intake in students was 30.708 g, zinc intake 3.2 mg, calcium intake 280.968 mg and potassium intake 659.233 mg. Bivariate analysis using Rank Spearman correlation test showed from 5 variable of nutrient intake, there were 3 variables that had correlation with plumbun level. The three variables were zinc intake, calcium intake and potassium intake, where all variables had p value of 0.05. Rank Spearman coefficient value of -0.194 for zinc intake, -0.192 for calcium intake and -0.191 for potassium intake. The coefficient was negative, it means that zinc, calcium and potassium had negative relationship with plumbun level. The interpretation was, the higher the zinc, calcium and potassium intake, the lower the plumbun level in blood.

Results showed there was no correlation between iron intake and plumbun level. This was probably

because there were other factors that are more influential for plumbun level, such as the other nutritional intake. This study was not in line with research conducted by Bagepally (2016) in India. The results showed the workers with plumbun level > 30 µg/dl (Fe 1745 ± 723 µg/l) had significantly (p<0.05) lower serum Fe ratio as compared to workers with plumbun level ≤ 30 µg/dL (Fe 2063 ± 784 µg/l). The serum Fe showed significant negative correlation with plumbun level<sup>[14]</sup>.

This study found a correlation between zinc intake and plumbun level in the blood. This was supported by previous research conducted by Chao (2014) in China. He reported that zinc supplementation proved to be a protective factor of high plumbun level in blood (p = 0.039). Iron, zinc, calcium and plumbun are all divalent metal ions, and are absorbed from the gastrointestinal tract and metabolized through common pathways. Dietary deficiencies of the trace iron, zinc, and calcium elements lead to increased plumbun absorption. A diet full of dairy products can act to diminish the absorption of plumbun<sup>[9]</sup>.

The result of study was conducted by Pramono, et al (2017) showed all school children in their study (100%) had plumbun level in blood ≥ 10 µg/dl and zinc serum levels < 65 µg/dl. Recently, even though plumbun level in blood less than 10 µg/dl is considered safe, a study confirmed that plumbun level in blood < 10 µg/dl has associated with cognitive deficits. Thus our data showed all children had low zinc serum levels (< 65 µg/dl). The Joint WHO/UNICEF/IAEA/IZiNCG asserted zinc serum levels < 65 µg/dl has been recognized as serious public health problems<sup>[15]</sup>.

Data indicated there was a correlation between calcium intake with plumbun level. A research conducted by Lacasana in Mexico city showed the average of blood lead level in 200 children under five years was 9.93 w g dl<sup>-1</sup> (range 1-31 w g dl<sup>-1</sup>). An inverse relationship was observed between plumbun levels in blood and daily calcium intake. This relationship was statistically significant among children aged 13 months - 5 years<sup>[16]</sup>.

In theory, under low-calcium dietary conditions may increase plumbun absorption<sup>[11]</sup>. Calcium is absorbed via passive transport through epithelial cell tight junctions, and via active, vitamin D-regulated, transport, which predominates, especially when intake levels are low to moderate. Plumbun uses both these mechanisms to cross intestinal cells, and the luminal calcium transport protein 1 (CaT1) exhibits high affinity for both calcium

and lead.<sup>39</sup> Therefore, competition between plumbun and calcium exists at the active transporter, and it makes sense that low calcium intake would be related to greater plumbun absorption. Because the expression of CaT1 is dependent on vitamin D, however, the status of this vitamin would play an important role in plumbun absorption<sup>[17]</sup>. Among postpartum women in Mexico City, lower levels of bone plumbun were associated with higher intakes of calcium, vitamin D, phosphorus, magnesium iron, zinc, and vitamin C, though these relationships showed inconsistent trends<sup>[18]</sup>.

The results showed a correlation between potassium intake and plumbun level in blood. In theory, a low intake of potassium will result in an increase in blood pressure. Potassium and plumbun have indirect correlation. This is because plumbun can have an impact on human health, such as hypertension, while low potassium intake can also affect the occurrence of hypertension. The results of Han's (2018) study in China showed plumbun level in blood was positively associated with systolic blood pressure (SBP) and diastolic blood pressure (DBP) and with the morbidity of hypertension in occupational populations with a high concentration of lead exposure<sup>[19]</sup>.

**Table 4: Distribution of Location of Residence, Nutritional Status and Parent's Education Level**

Variable	Frequency	Mean	p value
<b>Location of residence:</b>			
Living in Cinangka Village	94	54.62	0.004
Living outside Cinangka Village	9	24.61	
<b>Nutritional status:</b>			
Malnutrition	33	45.79	0.145
Normal	70	54.93	
<b>Mother's education:</b>			
Low education	81	55.27	0.032
High education	22	39.95	
<b>Father's education:</b>			
Low education	71	54.26	0.250
High education	32	46.98	

Table 4 shows that the mean of plumbun level in children who living in Cinangka Village (54.62 g/dl), were higher than plumbun level in children living outside Cinangka Village (24.61 g/dl). The result of Mhan-Whitney test showed that there was a difference mean of plumbun level in children living in Cinangka

Village and outside Cinangka Village, with p value of 0.004. For nutritional status variables, bivariate analysis showed that the mean of plumbun level in children with malnutrition condition and children with normal nutritional status were no different (p value of 0.145).

Meanwhile, children who had mothers with low education had mean of plumbun levels higher (55.27 g/dl) than children who had mother with high education level (39.95 g/dl). The result of bivariate analysis using Mhan-Whitney test showed that there was a mean difference of plumbun level in children who had mother with high and low education (p value = 0.032). Similar results were shown by Chao's research in China (2014). Based on bivariate analysis, p value of 0.000 with OR of 1.25 and CI = 1.14-1.37. Parents' level of education can indirectly affect children's plumbun level in blood. Parents' learning and understanding of plumbun poisoning is related to their level of education<sup>[9]</sup>. Mothers have an important role to regulate eating patterns in the family. Thus, theoretically the higher of mother's education level, the higher the level of knowledge she has. For the variable of father's education level, the result of bivariate analysis did not show any difference in the mean of plumbun level between children with high and low education father.

## CONCLUSIONS

Determinant factors of plumbun level in this study were location of residence, mother's education, intake of potassium, calcium and zinc. Variable of father's education, nutritional status, iron and protein intake were not determinant factors of plumbun level.

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**Conflict of Interest:** There was no conflict of interest in this study.

**Ethical Clearance:** This study has been approved by the Ethics Committee from Kuningan Health Science Institute.

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# Immunization Coverage on Infant in High-Risk Area in Semarang City Indonesia

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## ABSTRACT

In 2013, the national target of UCI was 86%, and 20% villages in Indonesia have not yet reached the national standard coverage. High risk Areas were very risky to have lower coverage. The aim this research was to identify the coverage of immunization (UCI) in Semarang City. The research is an observational descriptive with quantitative and qualitative approach. The high-risk areas in this study were Bandarharjo, Dadapsari, Kuningan, Pedurungan Lor, and Tanjungmas villages. The sample was 64 infants from all villages and the respondent were the infant's parent. UCI was measured using Rapid Card Check (RCC) form recommended by UNICEF. The results of the study indicated that several infants were still unimmunized. High-risk areas meant that the areas status was economically poor, crowded, and bad sanitation. Under-five mothers refused to immunize their babies for any reasons, such as because of religion, preoccupation, and sickness. Immunization was infant's right. Immunization was very important to maintain the infant's health from the disease in case of outbreak. Understanding of the infant's mother was necessary to raise the coverage of immunization in Semarang City.

**Keywords:** *Immunization coverage, UCI, RCC, High risk*

## INTRODUCTION

To eradicate infectious diseases is very difficult because their spread might go anywhere even across administrative boundaries. To prevent the spread of the disease to other areas, immunization is one of the measures although it is very cost effective. Immunization is of primary prevention efforts.<sup>(1)</sup>

According to Law Number 36, 2009 on Health, immunization is one of priority activities of the Ministry of Health. The main objective of the immunization program is to reduce morbidity and mortality caused by

preventable diseases by immunization (PDI). PDI is a contagious disease that potentially leads to outbreaks and death especially in Toddlers.<sup>(2)</sup>

Routine Data of Directorate General of P2P of 2015 showed that the coverage of complete basic immunization from 2013-2015 decreased from 89.9%, 86.9%, to 86.5% nationally.<sup>(3)</sup> According to routine data of 2013, the complete basic immunization coverage reached its target as stated in Strategic Plan (Renstra) of the Ministry of Health.<sup>(4)</sup> However, in 2014 and 2015, the immunization coverage did not reach its target of the strategic plan.<sup>(5)</sup>

In 2013-2015, the coverage of complete basic immunization in Central Java was 100.7%, 93.4%, and 97.2%. In the case of PDI, measles was considered extraordinary events (KLB), as there were 32 cases in 2013, 308 cases in 2014, and 576 cases in 2015.<sup>(6)</sup>

In Semarang City during 2013-2015, the basic immunization coverage decreased. The coverage of HB0

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immunization in 2013-2015 was 113%, 88%, and 94%; of BCG immunization was 118%; 102%; and 100%. Meanwhile, the immunization of Penta 3 was 121%; 100%, and 101%; of Polio 4 immunization was 120%, 100%, and 102%; and of Measles immunization was 122%, 101%, and 104%.<sup>(7)</sup>

In 2013, approximately 20% of villages in Indonesia did not meet the national UCI target of 86%. In Central Java during 2013-2015, the achievement of UCI was 99.14%, 99.7%, and 99.95%.<sup>(6)</sup> Meanwhile, in Semarang City in 2015, the number of villages that meet UCI was > 80%, as many as 177 villages (100%) from 177 villages. This number is still the same until today since 2013.<sup>(7)</sup>

The Government at district/municipal and provincial level undertaken by community health center shall carry out national planning for the implementation of immunization. The immunization planning includes identifying the location, logistical needs, and funding. In the era of decentralization, the success of the immunization program is largely determined by strong commitment, operational cost support, and other resources provided by local governments.

The condition of health of infants and toddlers in Semarang City is still high at the level of community health center. Based on the problems, the coverage of immunization in high risk areas in Semarang City was being the focus of the investigation

**METHOD**

The research design used in this research was descriptive observational with quantitative and qualitative approach that describes immunization coverage in Semarang City. The population was all parents who have babies of < 2 years old living in high-risk areas in Semarang City i.e. Bandarharjo, Dadapsari, Kuningan, Pedurungan Lor, and Tanjungmas. The sample was parents who have babies of < 2 years old in Semarang City with a total sample of 64 respondents. The technique in sampling in this research was random sampling. This research was conducted in 1 month from February-March 2017.

The research instrument used was Rapid Card Check (RCC) form recommended by UNICEF. The research variables include immunization coverage and accuracy of immunization.

**RESULT AND DISCUSSION**

**Table 1: Criteria of High Risk Community and Sources of Immunization Information**

Variables	Yes		No	
	f	%	f	%
<b>HRC Criteria</b>				
Slum	18	28.1	46	71.9
Poor	16	25.0	48	75.0
Boro	1	1.6	63	98.4
Minority	15	23.4	49	76.6
River banks	0	0	64	100
Railway Sides	0	0	64	100
Certain religion	0	0	64	100
Certain ethnicity	0	0	64	100
Others	0	0	64	100
<b>Source of information</b>				
Health worker	41	64.1	23	35.9
Kader	25	39.1	39	60.9
School	0	0	64	100
Religion Leaders	4	6.3	60	93.8
Friend/Neighbor	9	14.1	55	85.9
TV	11	17.2	53	82.8
Radio	0	0.0	64	100
Newspaper	1	1.6	63	98.4
Leaflet	0	0	64	100
Banner	0	0	64	100
Poster	2	3.1	62	96.9
Others	4	6.3	60	93.8

Table 1 shows that 18 out of 64 respondents chose slums as the greatest criteria in high-risk groups; while, riverbank, rail sides, religion, and ethnic were not categorizing as high-risk groups criteria.

Furthermore, 64.1% of respondents received immunization information from health workers; while, information from schools, radio, leaflets, and banners were not the sources for respondents.

**Table 2: Coverage and Accuracy of Immunization**

Variables	Yes		No	
	f	%	f	%
<b>Coverage of Immunization</b>				
HB0	47	73.4	17	26.6
BCG	49	76.6	15	23.4
Penta 3	31	48.4	33	51.6

Conted...

Polio 4	33	51.6	31	48.4
Measles	27	42.2	37	57.8
<b>Accuracy of Immunization</b>				
HB0	43	67.2	21	32.8
BCG	42	65.6	22	34.4
Penta 3	22	34.4	42	65.6
Polio 4	21	32.8	43	67.2
Measles	18	28.1	46	71.9

According to data research of basic immunization coverage in Semarang City, many parents did not immunize their children in that region. The most immunization not given was penta 3 immunization as many as 51.6% and measles as many as 57.8%.

The result showed that many mothers did not properly provide immunization to their baby. For HB0 immunization, 67.2% had immunized their baby at the age of 0-7 days; while, 32.8% of infants were immunized improperly time.

For BCG, 65.6% infants had received BCG immunization before their infants were 1 month old; while, 34.4% of infants were immunized improperly time.

For Penta 3, 34.4% of infants had been immunized Penta 3 before the baby was 4 months old; while, 65.6% of infants were immunized not at proper time.

For Polio 4, 32.8% of infants had received Polio 4 immunization before the baby was 4 months old; while, 67.2% of infants were immunized not at proper time.

For measles, 28.1% of infants had been immunized against Measles before the baby was 9 months old; while, 71.9% of infants were immunized not at proper time.

The result showed that immunization coverage in high-risk area in Semarang city was low because there were still infants who have not been immunized. Data from interviews showed that mothers did not immunize their children for several reasons such as sick children, parents were busy working, lack of knowledge, and religious factors believed that the vaccine used was forbidden (haram).

The research conducted Arumsari (2015) concluded that the reason most often raised by mothers who do not immunize their baby is due to busy mom working and inappropriate schedule of immunization.<sup>(8)</sup> Meanwhile,

Maryani and Sulastri (2009) stated that there are values and beliefs influence mother not to immunize their infant taken place in Blumbang Village Tawangmangu Subdistrict, Karanganyar Regency.<sup>(9)</sup>

Parents also stated that health officer's factors also affected the implementation of immunization by mothers. This finding was in accordance with the research conducted Adriani (2015) who stated that health officers who have poor performance affect the coverage of immunization.<sup>(10)</sup> This was also in line with the research of Kontesa & Mistuti (2013) in working area of community health center of Air Dingin, Kecamatan Koto Tengah, Kota Padang that more than half (57.6%) of respondents stated that a health officer in the working area of community health center Air Dingin, KotoTengah Subdistrict perform poorly.<sup>(11)</sup>

The absence of counseling from cadres caused little information of immunization mothers obtained and the mother feared about the emergence of ill effects after immunization. The lack of cadres in maximum reaching the mother was caused by several factors such as limited facilities and infrastructure in making home visits, lack of knowledge about immunization, and the number of reports that cadres must do.

This finding was consistent with L. Green's theory of enabling factors that include the availability of infrastructure, health care facilities, and individual health care needs.<sup>(12)</sup> In a study conducted by Adriani (2015), there was an association between education, training, and knowledge, posyandu facilities and infrastructure, motivation, wage salary, tenure, and cadre attitude with the performance of posyandu cadres on the performance of posyandu cadres.<sup>(10)</sup>

The impact was that mothers did not immunize nor delayed in giving immunization to their children. In addition, the cadres expressed the need for cooperation with religious leaders/community leaders in supporting immunization activities to encourage and convince community that immunization is religiously accepted (halal).

## CONCLUSION

The conclusion of this research is that there are still babies who still do not completely immunized on time in Semarang City. Immunization is the right of the baby.

Immunization is very important to keep baby's health from disease in case of outbreak. Maternal understanding needs to be developed to increase immunization coverage in Semarang City. Support of religious leaders/ community leaders can be the one of the efforts in encouraging people to immunize their children.

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**Conflict of Interest:** None

**Ethical Clearance:** The study was approved by the Ethics Committee on Public Health Faculty, Diponegoro University on April, 25th, 2018, Number 040/EC/FKM/2018

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# Qualitative Study: Patients Perception of PITC in Semarang's Hospitals

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## ABSTRACT

HIV test is the only way to know a person's HIV status. The number of patients who were initiated to do HIV test was very low, compared to the number of patients showing AIDS clinical symptoms and the number of babies born from HIV-positive-mother. Moreover, there was a great rejection from patients to do HIV test. The objective of this research was to describe hospital patients' perception of the implementation of PITC by health care workers. This was a qualitative research using case study design. Nine informants were in-depth interviewed from two hospitals in Semarang City which implement PITC. The result showed that patients were assuming that the initiation of HIV test by health care workers was important because they were hoping to know their sickness, so they could get the proper treatment as soon as possible. Information about HIV test was given incompletely, because PITC was practiced in short time and in a lack-of-privacy room. It is suggested to PITC implementers that the initiation of HIV test should be carried out by focusing more on patients understanding about why they were initiated to do HIV test and focusing more on the 3 C, especially the confidentiality as mentioned in PITC Guideline by Ministry of Health of Indonesia.

**Keywords:** PITC, HIV Test, Hospital, Patients

## INTRODUCTION

AIDS (Acquired Immune Deficiency Syndrome) appeared as an epidemic disease in several countries since years ago caused by HIV (Human Immunodeficiency Virus). This virus weakened human immune system. A person who infected by HIV could easily be infected by other germs, bacteria and viruses. The condition will then be called AIDS when the person has some opportunistic infections.<sup>1,2,3</sup>

HIV&AIDS cases is similar to the ice berg phenomenon. There are big numbers of unknown cases than the known cases. The only way to find the unknown cases is to implement HIV test to more people. HIV Test is encouraged among key populations.<sup>1,4,5</sup>

There are two types of HIV test based on the initiation, they are Client Initiated-Testing and Counseling (CITC) and Provider Initiated-Testing and Counseling (PITC). Client Initiated-Testing and Counseling (CITC) mostly known as Voluntary Counseling and Testing (VCT) in some countries. In VCT, patients come to the health facilities to do HIV test of their own willingness. The main reason they decided to do VCT is due to the feeling of vulnerability or at risk. However, not everyone willing to do HIV test, even those who are at high risk.<sup>6,7</sup>

Provider Initiated Testing and Counseling (PITC) is an HIV test that initiated by health care workers and offered to all patients. The implementation of PITC to all patients is expected to increase patients' access to do HIV test, society acceptance to HIV test, and HIV detection rate.<sup>7</sup> PITC should be offered to all patients who show clinical symptoms indicating HIV infections, without considering the epidemic level.<sup>8,9</sup>

The implementation of PITC in hospital is considered important to find new cases of AIDS. Health care workers need to initiate more suspected patients to do HIV test.

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Hospitals generally have facilities for Mother and Child Health, Tuberculosis, Sexual Transmitted Infections, and facilities for people at high risks.<sup>9,10</sup>

Semarang is at concentrated epidemics level of HIV, which means PITC must be implemented to all patients showing clinical symptoms of HIV and to all babies born from mother living with HIV. Based on annual report of PITC, from three hospitals in Semarang City, there were 341 patients who were pre tested in PITC in 2012.<sup>11</sup> The number of patients initiated to do HIV test was very low compare to the number of patients who have clinical symptoms indicating AIDS and the number of babies who were born from mother living with HIV.<sup>12</sup>

The big gap between the patients initiated to do HIV test with the patients who should have been initiated to do HIV test is a fundamental problem in PITC implementation in Semarang City. Based on the previous research conducted to PITC implementers in Semarang City, it was found that there was a great rejection from patients to do HIV test although the implementers were all trained well.<sup>13</sup>

Therefore, the objective of this research is to describe the patients' perception of PITC implementation in hospital setting.

## METHOD

This research was conducted by using qualitative method and case study approach to describe patients' perception of PITC implementation in hospital setting. This research was implemented in Semarang City, Central Java Province, Indonesia. The research site was chosen based on the existence of PITC program and regular report of PITC implementation to Semarang Health Office.

From 28 hospitals in Semarang City, there were only 3 hospitals who met the criteria. Those hospitals have different characteristics. Such as the patient's residences, the origin of referral, PITC implementer sector, and PITC implementers. However, this research was implemented in two hospitals due to permission issues.

The sampling was done by purposive sampling method because the informants in this research are patients who have been initiated to do HIV test by health care workers. There were 9 informants who were in-depth interviewed.

Data was content analyzed and used triangulation for the validation method. The triangulation was done by in-depth interviewing the PTC implementers, Head Unit of HIV or VCT, and to the Person in Charge (PIC) of HIV program or VCT program at the related hospital.

## RESULTS AND DISCUSSIONS

**Characteristics:** There were 9 informants who participate in this research. Informants were in productive age. The youngest informant was 22 years old. The oldest informant was 38 years old. Five informants were female and four informants were male.

All of the informants had finished 9-years compulsory education. Two informants were graduated from Junior High School. Seven informants were graduated from Senior High School.

Six of the informants were married. One of the married informants admitted that the partner had opportunistic infections of AIDS. And the partner was once initiated to do HIV test by health care workers.

Four of the informants admitted that they did unsafe sex with many sexual partners. Which means, they never used condoms everytime they are having sex.

Three of the informants did HIV test before being initiated in current hospitals. One of them was initiated by midwife in public health center. The other was forced by the prison guard. And the other one was doing it by his own willingness. While the six others never had HIV test before and never being initiated to do HIV test.

Result showed that 2 informants were mother who gave birth and 7 informants were patients with severe infections. Most of the informants had opportunistic infections.

**The Delivery of Health Care Workers:** Result showed that almost all of the informants thought that the health care workers were nice, care, patient and communicative when initiating HIV test. The health care workers also giving the chances for patients to ask anything that patients need to know. Eventhough some informants did not asked anything because they did not know what to ask.

The attitude of health care workers made patients felt comfortable when they are implementing PITC, from the beginning of giving the information about HIV test until the PITC process is finished. Therefore, it made the patients felt satisfied.

However, one of the informants thought that the attitude of health care workers was not communicative and not friendly. Informant stated that the health care workers were unfriendly, grumpy and curt, including the health care worker who implement PITC. This condition is uncomfortable for informant. The feeling of uncomfortable could affect informants' reception to HIV test, hence informants would feel unsatisfied with the service from health care workers.

In a service, there are some external factors that influence consumer's perception. A study completed by Gulliver about health services showed that the characteristics of health care workers could influence patient's perception to given services. The characteristics are race, health care worker's ability in doing certain services, and health care workers credibility.<sup>14</sup>

Most of the informants thought that there were only a little information that were given in PITC. Most of health care workers only asked informants' risky behavior history. They did not explain anything about HIV&AIDS or anything related to HIV test to informants. However, all of the informants said that PITC implementers explained the reason for initiating HIV test to them. They also explained that HIV test and the result of HIV test is confidential. The PITC implementers also explained that patients have the right not to tell anyone about the HIV test result, but PITC implementers suggest them to tell their spouses as a precautions and to initiate HIV test to their spouses.

The explanation from informants proved that the information that was given in PITC implementation was not consistent to the Guidance of PITC implementation by Health Ministry of Republic Indonesia. The pre test information should be focusing on three components : give important information about HIV&AIDS, explain the procedure to guarantee confidentiality, and make sure the patient is willing to do the test and ask their consent.<sup>8,10</sup>

Those three components were not delivered by all of the PITC implementers. According to some informants, the PITC implementers did not delivered important information about HIV&AIDS and the procedure to guarantee patients' confidentiality. They only asked for patients' consent to do HIV test. However, based on the triangulation result with PITC implementers and the Head of VCT Unit, they stated that the patients might

not understand entirely about the information that was given by PITC implementers when they were initiated to do HIV test. Patients tend to agree to anything that was offered by health care workers, including PITC implementers, because patients had high hope to recover.

All of the informants thought the communication method which was used by health care workers when implementing PITC was good enough. Informants felt comfortable because PITC implementers were using interpersonal communication method and it made them feel more private. Almost all of the informants did not need any media in receiveing any information related to HIV test and HIV&AIDS. However, the PITC implementers in one hospital stated that he needed to bring paper or flip notes (writing media) when implementing PITC to a patient who stayed in a ward full with other patients (and patients companion), and it was not possible to move patients to another empty room. The paper or flip notes will be used to write sensitive words such as HIV, HIV Test, and other sensitive words. The PITC implementers will write those words on the writing media and tried to avoid saying those words. Hence, when the PITC implementers had to say it, he will only need to point at the paper or flip notes.

That method was done in order to keep the confidentiality, so patients will be spared from stigma and discrimination that might happen in the future. Also in order to prevent other patients or other people in the ward knew what PITC implementers doing to the patients.

Based on the Guidance of PITC implementation by Ministry of Health, the delivery of pre test information could be given individually, pair or groups, according to the condition. However, the consent have to be given individually, private, witnessed by health care workers.<sup>8,10</sup>

**The Place and Time:** The PITC implementers initiate HIV test in varied places. PITC implemented depends on patients' condition. The result of this research showed that most of the informants were initiated to do HIV test in the inpatient room. One of them stayed in a one-bed-inpatient room, so the PITC implementation was done in the room without worrying that their conversation could be heard by other people. Other informants were staying in a two-beds-inpatient room, four-beds-inpatient room, and six-beds-ward. Three informants stated that the HIV test initiation was implemented in a 6-beds-ward

with full of people. Ideally, PITC implementer should move the patients to other room with more privacy so the initiation process could be done by prioritizing the confidentiality. According the triangulation result to the PITC implementers and Head of VCT Unit, such condition happened due to patients' condition (having severe disease or not able to move out of the bed), they could not be moved to another room, even sometimes there was no empty room that could be used by PITC implementers. Therefore, the PITC will be done in the inpatient room whether there were a lot of people or not. However, the PITC will be done very carefully by closing the separator curtain and talking with very low volume as long as the patient could hear. Informants stated that they did not mind to do PITC in their inpatient room or wards, because they wanted to be recovered as soon as possible, so whatever they need to do, they will do it.

Four of the informants stated that the HIV test initiation was conducted in 5 minutes. While three informants stated that the HIV test initiation was conducted in 30 minutes. However, there were two informants who stated that the initiation was done in a very short time. Informants explained that the PITC implementers were in a rush and only explained that their blood will be tested and informants were asked to sign the informed consent, without any explanation about HIV&AIDS and HIV test. Even PITC implementers did not explain about the reason of taking the blood sample. All of the informants thought that the HIV test initiation should be carried out for about 10 to 30 minutes, so informants could get enough information about the reason they were initiated, about HIV&AIDS and about HIV test. However, almost all of the informants perceived that the place and time in PITC implementation is satisfying enough. It is corresponding with the study from Anjaryani in 2009, which stated that attitude, behavior, speech, friendliness and easy access to information and communication ranked the highest in patient's perception of satisfaction. Eventhough patients felt the outcome was not suitable to their expectation, but they still feel satisfied enough if they were served with the attitude that respect their feelings and dignity.<sup>15</sup>

According to the triangulation result, the PITC implementers from both hospital stated that they tried their best to implement PITC. However, in the implementation of any programs, there will be some obstacles, as well as in the implementation of PITC. The

condition of patients that were impossible to be moved to a more private room made the PITC implementer forced to "cheat" such situation. However, the "cheating" act was considered as a solution to PITC implementers so PITC could still be implemented without decreasing the focus of the implementation and uphold the 3 C principle (Consent, Counselling, Confidentiality).

## CONCLUSIONS

Informants perceived that PITC is important for them, therefore they agree to do HIV test. However, they need a longer pre HIV test, because they need more information about the reason they were initiated, about HIV&AIDS, and about HIV test when PITC was implemented to them. It is suggested that PITC could be implemented by focusing more on patients understanding about why they were initiated to do HIV test and focusing more on the 3 C, especially the Confidentiality.

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**Conflict of Interest:** This research has no conflict of interest.

**Ethical Clearance:** This research has been approved by the Ethical Committee of Medical Faculty of Diponegoro University-RSUP dr. Kariadi Semarang No. 555/EC/FK-RSDK/2014 in October 3rd 2014.

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# System Dynamic Model of Leptospirosis Control in Demak, Indonesia, 2014

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## ABSTRACT

Cases of leptospirosis persist in Demak District of Indonesia every year. It's needed a mix method (epidemiology, ecology, and system thinking approach) to analyze and to choose the best intervention based on time series data. The study located in Demak, Jawa Tengah on May to November, 2014. Based on an existing model that formulated by time series data for six years (2007 – 2013), leptospirosis control was simulated using a system dynamics method. The simulation was based on seven pre-defined scenarios. The software used to assist the completion of the dynamic model was Powersim version 2.5 for Windows. Predictions extended over 5 years. The model predicted that, if the intervention was biological control and included rodent control, the leptospirosis cases could be prevented up to 20.7%. Wound care could prevent up to 1.6% of the disease. Efforts to prevent direct contact between healthy humans and urine of infected rodents had the strongest impact on reducing leptospirosis in this model, as this could decrease cases by up to 98.14%. Domestic waste management as a source of rodent food in households reduced the predicted number of leptospirosis cases by 1.8%. A combination of the prevention of contact between healthy humans with contaminated water, wound care, biological and mechanical rodent control, and domestic waste management together resulted in a predicted incidence of 0.45% leptospirosis cases per year. The model was a useful tool to predict the efficiency of leptospirosis control under various intervention scenarios.

**Keywords:** leptospirosis, system dynamic model, control, interventions, scenarios

## INTRODUCTION

Leptospirosis is a zoonosis which can be transmitted by domestic animals (dogs, cats, pigs, cattle) and rodents, especially rats. The International Leptospirosis Society (ILS) has mentioned that mortality on Indonesia's incidence rate of leptospirosis was declared as third in the world <sup>1</sup>. Based on data of Central Java Provincial Health Office in 2010, several areas with leptospirosis were Semarang, Demak, Klaten, Pati and Purworejo. <sup>2</sup>

Cases of leptospirosis persist in Demak District of Indonesia every year. Leptospirosis in Demak had been known since 2003. Until 2013 there were still cases of

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leptospirosis. In 2011 there were 20 cases of leptospirosis with 1 death. In 2012 there were 13 cases with 2 deaths and in 2013 until July were 13 cases with 2 deaths.<sup>3</sup>

Leptospirosis is a disease based on dynamic environment. It has several epidemiology's settings too. Epidemiology of leptospirosis specific localized in several areas with different environmental conditions. But, efforts to control leptospirosis has not been a comprehensive and integrated into a single entity based on risk factors that interact each other.

To understand the dynamics of transmission of leptospirosis, some authors propose different mathematical models. Previous study on leptospirosis' risk factors as a basis for control recommendations made by statistical methods. Leptospirosis risk factor study had been conducted by Priyanto, 2007, Cahyati, 2008, Ikawati, 2009, Ningsih, 2009, Lestari, 2009, and Putri, 2009.<sup>4-9</sup> In statistical methods, the relationship between variables is one-way. Meanwhile, the characteristics of the system dynamics method, the variables that exist in the system changes with the change of time (dynamic), accounted the nonlinearities, and related reciprocally.<sup>10</sup>

The model is a form that is made to simulate a symptom, structures, systems, picture (abstraction) of a system, which is used to solve the problem. The capacity of the human mind for formulating and solving complex problems is very small when compared to the scope of the problem itself, because the solution should be in accordance with the real behavior of the rational.<sup>11</sup>

Leptospirosis control efforts adapted to the case data and existing risk factors. Various efforts to control leptospirosis as a form of control model that has been done by District Health Office in Demak were screening, socialization to the village level, technical facilitation to the prevention and eradication of diseases officer. Another leptospirosis prevention undertaken in Demak were disinfection and increased knowledge and practice of the wounds in the skin detection and also treatment that carried out in small groups. All efforts need community's supports for improving hygienic behavior and healthy environment.<sup>12</sup> Efforts to control leptospirosis has not been a comprehensive and integrated into a single entity based on risk factors that interact each other. It's needed a mix method (epidemiology, ecology, and system thinking approach) to analyze and to choose the best intervention based on time series data. Based on the

existing model, its developed a model of leptospirosis control by system dynamics method. From the existing leptospirosis problems in Demak District, it can be formulated the purpose of study was to develop a model of leptospirosis control, precisely in Demak District, with system dynamics method. Control models need to be developed in leptospirosis endemic areas with respect to appropriate environmental risk factors and factors that interact with each other to form a complex mutual relationship (causal loop). The purpose of study was to develop a model of leptospirosis control, precisely in Demak District, with system dynamics method.

Although this study has been going on for a while, but the results of this study will be expected to be useful as a reference for further research in the field of leptospirosis in Indonesia. As far as researcher know this study is rarely is done, because it is particularly about leptospirosis, one of neglected disease, in Indonesia, moreover using system approach specially modeling with system dynamic.

## METHOD

The study located in Demak, Jawa Tengah on May to November, 2014. Based on an existing model that formulated by time series data for six years (2007 – 2013), leptospirosis control was simulated using a system dynamics method. The simulation was based on seven pre-defined scenarios. The software used to assist the completion of the dynamic model was Powersim version 2.5 for Windows. Predictions extended over 5 years.

The application had permission from the Regional Investment Board of Central Java Province and the Board of Kesbangpolinmas (National Unity, Politics and Community Protection Agency) of Demak Regency. Before the research, there was socialization of the research.

The modeling flow began with the formulation of Causal Loop Diagram (CLD) and Stock Flow Diagram (SFD) incidence of leptospirosis. Causal loop diagram (CLD) is a diagram that describes the causal relationships of the components that build the system. Formulation was done by brain storming method by inviting experts and researchers leptospirosis, and expert of system dynamics modelling. The participants of CLD formulation were the research team of Banjarnegara Research and Development of Zoonosis Control Unit, the holder of leptospirosis program of Demak District

Health Office and the livestock farming officer. After compiled CLD concepts followed by the preparation of Stock Flow Diagram (SFD). Stock Flow Diagram (SFD) is a computer diagram that describes CLD using Powersim software. The data of the SFD constituent variables in the system dynamics model of leptospirosis occurrence which be collected in this study were secondary data from epidemiological investigations of health workers in Demak and from previous related studies, supplemented with primary data collected.

Causal loop diagrams (CLDs) that have been created along with SFD were tested in advance of the validity of the model using visual validation and statistical validation.<sup>13</sup> The model is valid if it is scientifically proven capable of simulating actual system performance. Visually, the model is called valid if the behavior (form graph) model simulation results to Stock variables approach or resemble graphic form of real simulation results based on reference data in time series. The method used to determine the validity of statistical model in this research is Absolute Mean Error (AME) method. Absolute Mean Error (AME) method calculated by calculating the difference in the value of the simulation results variable and the variable value based on real data divided by real values. If the calculation results of  $AME \leq 0.10$  for a controlled Stock variable, then the model is said to be valid. For uncontrolled Stock variables it is declared valid if  $AME \leq 0.30$ .<sup>13</sup>

In this study, the data included in the modeling was secondary data from 2007 to 2013, or at least three years from 2011 to 2013, supported by data of 2014. Data had not obtained by numbers, determined by interpolation or extrapolation methods. Controlled stock variables used in this study were “healthy man”, “human leptospirosis”, and “human healed”. While the uncontrolled Stock variable was “rat population” and “infected rat”.

The next step is to test the consistency of model dimension to know the consistency of unit of measure or unit of each variable and relationship between variables. If the model turns out to be invalid or inconsistent, then identify the source of the error and the corrective actions stated in the table. The model was improved and tested for validity and consistency. The validation test used visual test by compare the graph of accumulation cases' trend and the graph of simulation.

After the model was valid and consistent, a model simulation was used to predict the performance of the

system in a business-as-usual condition, followed by a sensitivity test that aims to explain the sensitivity of parameters, variables, and relationships among variables in the model. Furthermore, it was possible to determine possible intervention scenarios. The final step was optimization of the model that was to achieve optimal conditions by choosing the best scenario that can reduce the incidence of leptospirosis in 5 years to come (2019). Variable or combination of variables after the intervention simulation test showed the highest decrease in leptospirosis occurrence, defined as the variable having the highest leverage in decreasing the incidence of leptospirosis (leverage variables).

Data modeling processed and analyzed by system dynamics approach using software Powersim Constructor Version 2.5d.

## RESULTS AND DISCUSSIONS

In accordance with the modeling flow and test the validity of the model, the CLD and SFD models in this study experienced several changes and corrections. The story was prepared in accordance with the existing problems in Demak District as follows.

People with leptospirosis were still present in Demak District. The number was likely increased since 2011. In 2011 the number of people or healthy people but at risk of contracting leptospirosis in Demak were 1,122,905 people. In 2012 it dropped to 1,092,622 people. In 2013 it was 1,162,967 people. Human leptospirosis patients treated quickly and appropriately can be cured. The greater the rate of treatment, the number of people who recover was increasing. In contrast, patients with untreated leptospirosis were more numerous then the rate of death increases, so in the end the number of leptospirosis patients who died was also increasing. The rate of treatment of leptospirosis patients in Demak District from 2007 to 2013 was 100%. This shows that all reported patients received treatment. But not all patients who had been treated had healing. The average recovery rate reached 79.3%. This calculation was seen from the number of patients atreated and not died. (Number of treated patients minus the number of people who died).

Leptospirosis is transmitted primarily through contact with contaminated urine of rat infected with *Leptospira* bacteria, or other reservoir animals infected with the bacteria. The rate of transmission will increase

if the contact is supported by the existence of injuries in a healthy human body. *Leptospira* bacteria can more easily enter into the healthy human body especially through the wound. The more the number of urine rat and other infected reservoir animals that pollute the water source in the environment, then the amount of water contaminated *leptospira* bacteria will be more and more, so the number of contacts with water the more contaminated. Direct contact with the urine of infected rat or the urine of other infected reservoir animals may also increase the rate of leptospirosis transmission in man. Rats are the main reservoir of leptospirosis. The more rat populations the more the number of infected rats will increase the amount of urine rat that can contaminate the water in the environment. The rate of infection in rat populations is affected by the number of rat population and infection rate. From the results of laboratory tests in primary data collection in this study showed the results that 8.5% of rats were captured positive leptospirosis. Increased rat population was influenced by the increasing rate of birth of rats. The rate of birth of rats increases when the population of female rats and their fertility increases as well. The number of rats that died after being infected with leptospires bacteria more and more when the rate

of death is greater. And the rate of death was affected by the constant death of rat. Assumed rat's mortality due to leptospirosis infected reached 1%.

It is assumed that the amount of water source in Demak is the source of water used by every person every year that was 10 liters (Demak Regency statistical data) plus an average of 21 liters of rainfall per year. The amount of contaminated water was assumed to be the sum of number water, urine rat infected with the urine of other infected reservoir animals. Other infected animal reservoir urine was assumed to be 5 liters per year (regardless of animal species, due to very limited data), urine rat per head per year averaging of 0.96 liters (rough estimation from Suratman, 2003)<sup>14</sup> and the number of rat populations of 1.650.000 rats determined based on the number of rats caught during the rat survey in a village in Demak, which is considered 7% of the total number of rats (population of rats in Demak), multiplied by the number of villages in Demak multiplied by 10, and the amount was assumed to be almost stable every year.

After experiencing several changes of cycles , the final CLD was obtained as shown in Figure 1.

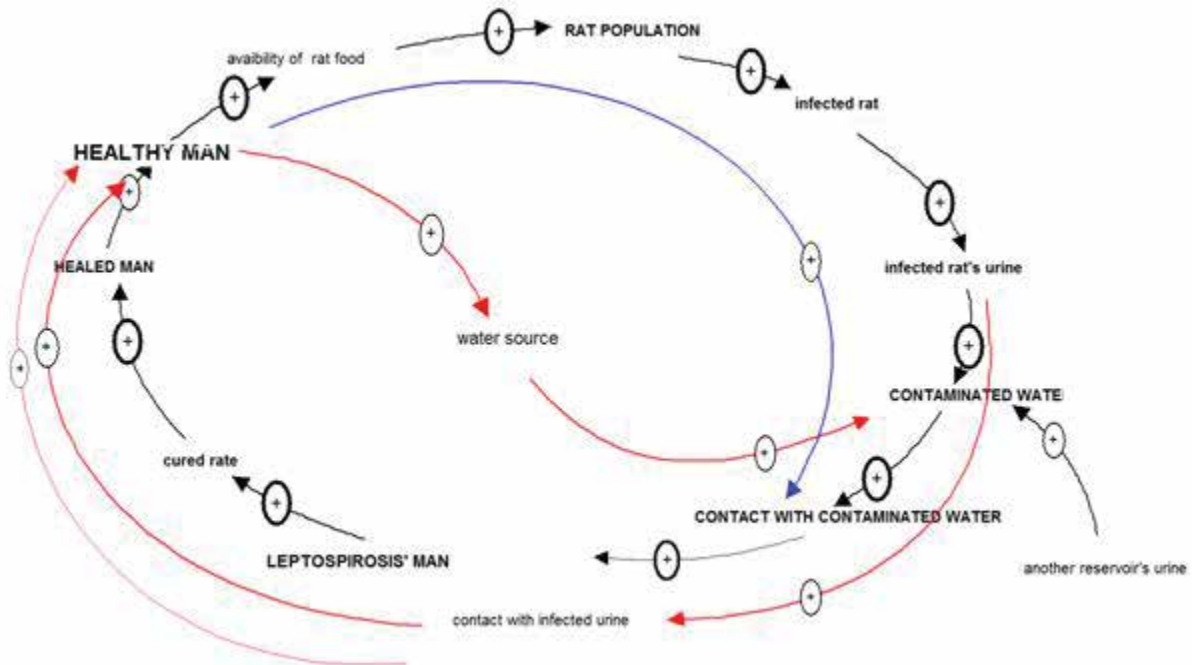


Fig. 1. Causal loop diagram

The sequence of leptospirosis events in the real world begins in healthy humans. The more healthy the number of people, the amount of food for rat will increase. The number of food for rats is increasing, the

rat population is also increasing. If the rat population increases then the number of rat infected with leptospirosis will also increase. The number of infected rat increased will increase the amount of urine rat

contaminated with leptospira bacteria. The number of urine of infected rat increases, it will further increase the amount of water in the environment contaminated leptospira bacteria. The amount of contaminated water increased also due to the additional amount of urine of other reservoir animals infected by leptospira bacteria which also increased. If the amount of contaminated water increases in the environment around humans, then the number of contacts between humans and water contaminated with leptospira bacteria will increase as well. The number of contacts between humans and contaminated water, which includes the type of indirect contact in leptospirosis transmission, if increasing, the number of leptospirosis patients will also increase. The number of people with leptospirosis is increasing, the rate of treatment is increasing so that the number of people who recover from leptospirosis disease will also increase. Thus will again increase the number of healthy humans. This circuit is a large loop called Reinforcing or is positive loop.

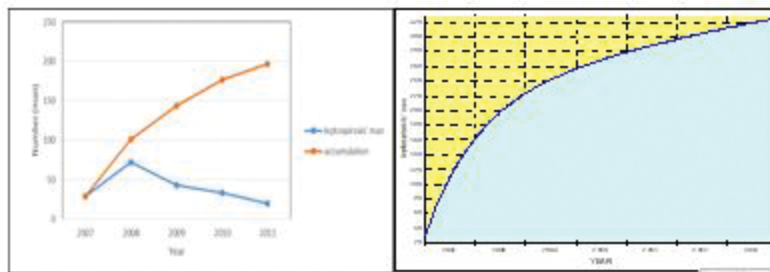
The small loop in the CLD begins with an increasing number of healthy people that will increase the amount of water sources used. The increased number of water sources will increase the amount of water contaminated. The amount of contaminated water increases will

increase the number of contacts between humans with contaminated water, and so on to increase the number of human leptospirosis patients. This series is positive.

The next small loops indicate a direct contact with leptospirosis. The first loop is the one that connects the infected rat urine variables, the contact with the urine of the infected rat, and the leptospirosis' man. The second loop is the linking of the urine variables of other infected reservoir animals, contact with the animal urine of the other infected reservoir and the number of leptospirosis' man. Both small loops are positive.

Based on the CLD was made SFD. In the SFD there was the addition of several variables for more logical relationship between the variables in the CLD. Added variables were the rate of transmission, the rate of recovery, the presence of injury, the use of water per person, the rate of domestic waste per person, the fertility of rats, the birth rate, the rate of infection (transmission of leptospirosis in rats), infection rate, urine volume per rat, and rat death rates.

Results of real data simulation on the leptospirosis control model during 2007 - 2014 are presented in Fig 2. Figure 2 also showed comparison of the real data's graph and the simulation's graph.



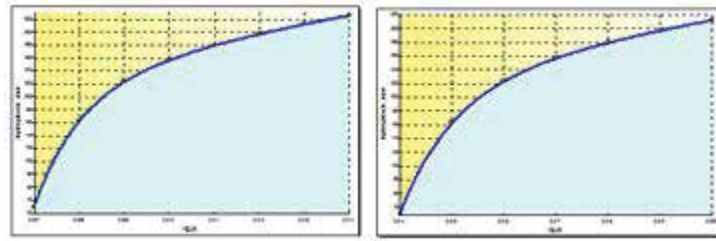
**Fig. 2: Comparison of real data graph (left) with model simulation graph (right)**

Figure 2 showed that the model was valid based on validation test visually. The behavior pattern of the occurrence of leptospirosis (accumulation) based on existing data from 2007 - 2013 in Demak Regency shows a pattern of behavior similar to the pattern of behavior of graphs of the model simulation results. Validation results by means of statistics based on the results of the calculation of AME of 0.3 which means that it meets the validity requirements of  $\leq 0.3$  indicates that the model is valid.

Parameters in the simulation model of leptospirosis control are the number of people with leptospirosis. Although the pattern of behavior of the number

of leptospirosis sufferers tends to increase, but the controlling limit is in the rat population and the rate of treatment. In certain numbers and circumstances, the number of rat populations will be controlled by itself. For example the availability of food for rats. The increasing number of rat populations, the available land as a food source for rats will decrease. At certain times, the ability of rat fertility will also decrease, so the number of rat births will decrease or be most unstable.

Graphs of real data simulation results on leptospirosis control models during 2007 - 2014 are presented in Figure 3.



**Fig. 3: Graph of simulation results of leptospirosis’ man (cases) in 2007 - 2014 and graph of simulation results predicting the leptospirosis’ man (business as usual) in Demak Regency 2014–2020**

The prediction needed in this study is that during 2015, at the start of the implementation of the intervention, until 2020 (six years) considering that the prediction of the incidence of the disease should not be too long. The timing of predictions that are too short will reduce the aspects of system dynamics analyzed, while if it is too long it can reduce its validity.<sup>15</sup>

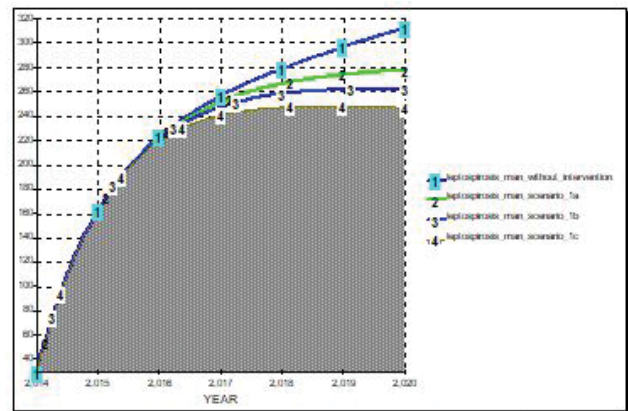
As an initial state for the number of people with leptospirosis in 2014 amounting to 30, the number of people recovered by 25, and the number of healthy humans assumed by the number of people in 2013 plus the average increase in population each year in Demak Regency from 2007 - 2013, so the number in the year 2014 amounting to 1,177,453 people. Without intervention, the number of leptospirosis’ man in 2020 can reach an accumulated number of more than 311 people.

The simulation was based on seven pre-defined scenarios. Interventions offered in the form of scenarios in the form of possible control measures to reduce the number of leptospirosis cases or humans in Demak Regency until 2020.

Scenario 1, the intervention carried out in 2015 was in the form of control of rats both chemically, biologically and mechanically, and made 3 combinations. In this modeling the intervention is biologically in the form of owl maintenance, cat care, natural rodenticide utilization, and the use of Mindi plant extracts to reduce the fertility of female rat. Mechanically in the form of life and dead rat trap installation. Combination 1 (scenario 1a): biologically 10%, chemically 5% and mechanically 20%. In this combination, rat are mechanically controlled more than biological or chemical. Chemical control is done at least considering the impact of using chemicals or rat poisons can cause various disturbances to the environment. In combination 2, efforts to control rat biologically are 50%, chemically 5% and

mechanically 20%. In this combination, biological control of rat is attempted more than chemically or mechanically. In scenario 1c includes biological control efforts 100%, chemically 5% and mechanically 100%. In this combination, control of rat biologically and mechanically is strived to be very maximum compared to chemistry.

Comparison of the difference in the decrease in the number of people with leptospirosis according to the model simulation prediction in Demak Regency in 2016-2020 with the implementation of intervention in the form of controlling rats with three combinations in 2015, is presented in Figure 4.



**Fig. 4: Comparison of graphs of simulation results predicting the human amount of leptospirosis patients in demak regency 2014-2020 without intervention and with rat control intervention (scenario 1) combinations 1, 2 and 3 in 2015**

Both of these results indicate that the rat control intervention that has the greatest leverage in reducing the number of people with leptospirosis in the model in this study is a 1c scenario that combines biological and mechanical control efforts of rat and mechanics optimally while striving for a little control by chemical means. The decrease in the number of people with leptospirosis in 2020 can reach 20.67%.

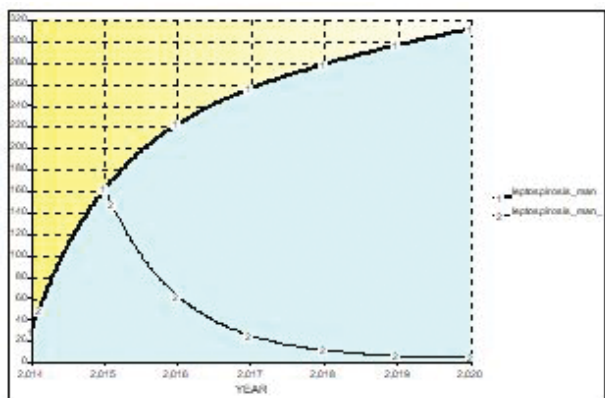


In scenario 2, the intervention carried out in 2015 in the form of termination or prevention of contact between healthy humans and water in the environment contaminated with leptospira bacteria showed a prediction of a decrease in the number of people with leptospirosis by 2020 of 0.01% per year.

In scenario 3, the intervention carried out in 2015 was wound care. Prediction of the decrease in the number of people with leptospirosis by 2020 is between 0.01 - 1, 6%.

In scenario 4, the intervention carried out in 2015 was the termination or prevention of contact between healthy humans and the urine of infected rat.

Comparison of the graphs from the simulation results of predicting the number of leptospirosis patients without intervention and intervention to prevent contact between healthy humans and urine of infected rat is presented in Figure 5.



**Fig. 5: Comparison of graphs of simulation results of 2014-2020 human leptospirosis patients number without intervention and intervention prevention of contact between healthy humans and infected rat urine**

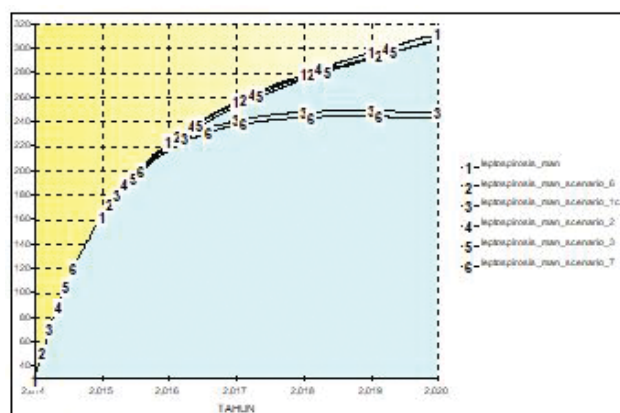
Prediction of the decrease in the number of people with leptospirosis by 2020 is between 71.66 - 98.14%. The graph experienced a decline in 2016 after the intervention in 2015. This very large decrease showed the variable leverage of direct contact with the urine of infected rat was very large in reducing the incidence of leptospirosis.

In scenario 5, the intervention carried out in 2015 was the termination or prevention of healthy human contact with the urine of other infected reservoir animals. Prediction of the decrease in the number of people with leptospirosis by 2020 with the intervention to prevent

direct contact with animal urine in other reservoirs in 2015, showed no decrease in the number of sufferers. These variables have no effect on leptospirosis control for the next five years.

In scenario 6, the intervention carried out in 2015 was in the form of reducing or managing domestic waste which could be a source of food availability for rats in the house. Predictions of a decrease in the number of people with leptospirosis by 2020 were between 0.05 - 1.81%.

In scenario 7, the intervention carried out in 2015 was in the form of a combination or combination of control of combination rats 3, termination or prevention of contact between healthy humans and water in an environment contaminated with leptospira bacteria, wound care and domestic waste management. Comparison of charts in scenario 7 is presented in Figure 6.



**Fig. 6: Comparison of graphs of simulation results of 2014 - 2020 human leptospirosis patients without interventions and with rat control intervention combination 3, prevention of contact between healthy humans and water in leptospira bacteria contaminated environment, wound care, and domestic waste management**

Based on Figure 6, prediction of the decrease in the number of people with leptospirosis by 2020 is between 0.05 - 22.07%.

Furthermorw, roughly, it is estimated that the costs necessary to implement these interventions. Scenarios offered in this study along with the magnitude of leverage in reducing the number of leptospirosis sufferers up to 2020 and the estimated costs required to carry out the intervention are presented in Table 1.

**Table 1: Comparison of variable powers to decrease the number of leptospirosis cases in 2016-2020 and the estimated cost required for the implementation of the intervention in 2015**

Scenarios		Leverage	Estimated cost required
Rodent control	biological 10%, chemical 5%, and mechanical 20%	0.17 – 11.09%	Rp 18,500,000.00
	biological 50%, chemical 5%, and mechanical 20%	0.01 – 16.08%	Rp 60,500,000.00
	biological 100%, chemical 5%, and mechanical 100%	1.56 – 20.67%	Rp 167,000,000.00
2. Contact Prevention with contaminated water		0.01%	Rp 9,010,000.00
3. Wound care		0.01 – 1.6%	Rp 1,400,000.00
Prevention of contact with urine of infected rats		71.66 – 98.14%	Rp 9,500,000.00
Prevention of contact with urine of infected reservoir animals		0.01%	-
Domestic waste management		0.05 – 1.81%	Rp 9,500,000.00
Combination of rat biological control 100%, chemical 5%, and 100% mechanics, prevention of contact with contaminated water, wound care, and domestic waste management		0.05 – 22.07%	Rp 184,910,000.00

There is one possible intervention that can be performed with sufficient leverage to lower leptospirosis cases, technically and economically. It was scenario 6.

The modeling results in this study indicate that the variables that have the greatest leverage and estimated costs of implementing low interventions are direct contact with the urine of infected rat. However, it is necessary to consider the technical ease of implementing the intervention in the community. To find out the urine of infected rat or infected mouse, it is difficult to do, given the lack of in-depth research on leptospirosis in rat in the field, including the mechanism or cycle of transmission between rat and diseased in the environment. Rats or rat infected with leptospirosis do not show specific pain or symptoms. Rat and cecuruts that are infected will become carriers or carriers of leptospira for the rest of their lives, thus becoming a source of leptospirosis transmission in their habitat. The results of the examination of blood samples of rats caught in the 2014 study showed that only house rats (*Rattus tanezumi*) were found to be positive for leptospirosis, although the results of the survey also obtained rats (*Rattus norvegicus*) and cecurut (*Suncus murinus*). According to data from the Demak District Health Office, from the examination of kidney samples conducted by BBTCL (environmental health engineering center) Yogyakarta in Demak it was found that 50% of rat got leptospirosis positive, supported by environmental data (water and soil) which were also leptospirosis positive.

Habitat of house rats depends on human settlements. Based on the relationship with humans, the ecological

spread of house rats is included in the domestic type group, because all activities of living rats are inside the house, closed between the walls of the kitchen, cupboard, warehouse, office, market, gutter and others related to human life.<sup>14</sup> The habitat of house and cecurut rat is very close and depends on human settlements or places of residence, causing the presence of rat and cecurut which are the main reservoirs of leptospirosis that need to be watched and avoided. Ratproof (anti rat) house arrangement is very necessary as an effort to control rat and prevent contact with rat including contact with urine.

Leptospira bacteria live in the kidneys of rats and the sprays are then removed together with the urine. Actually in the outer environment, leptospira bacteria are also not easy to breed. Leptospira bacteria are of many types and consist of hundreds of serovars. Some are pathogenic and some are not. Leptospira bacteria can live well in the outside environment in conditions that support including acidity, salinity, lighting, and velocity of water flow.<sup>16</sup> With the increasingly known factors that support the growth and proliferation of leptospira bacteria in the environment, the effort to control leptospirosis should also be easier.

The results showed that rats were the main reservoir of leptospirosis. Rat control can be done in various ways, both biologically, chemically and mechanically.<sup>16</sup> Mechanical control using traps in the form of shots, mousetrap with bait, rat glue and batter, has been done by most of the respondents of leptospirosis suspects in Demak Regency. Biological control by raising cats and



owls has also been done in Demak Regency. One of them is owl farms managed by farmer groups, and has been proven to be able to control rats in rice fields up to 50%. However, biological control also has many weaknesses. Maintenance of owls requires considerable costs and is more suitable for controlling rats in rice fields. While from the results of the collection and examination of rat kidney samples in this study, it is known that the type of rat that is leptospirosis positive is *Rattus tanezumi* (house rat). Controlling house rats using predatory properties in owls is not appropriate. Residential areas or settlements will be quite difficult for owls to chase their prey in the form of house rat that will easily hide in habitats that become one with a residence or human home. One of the limitations in this study is that there have been no surveys or arrests of field rat to be taken and examined for kidney samples whether or not leptospirosis is positive. If it turns out that the field rat also have a large contribution to the leptospirosis transmission cycle, then the control of rats using owls will be appropriate.

Efforts to control rat by biologically intervening in the form of raising cats that are known as natural predators of rat, are quite inexpensive. But the effectiveness of the control is now in doubt, given the fondness of eating cats, starting to switch to the types of food that humans eat. In addition, in the cycle and method of transmission of leptospirosis, cats are also a reservoir of leptospirosis.

Efforts to control rat using poisons which are one of the chemical methods, should also be avoided, given some of the side effects they cause. For example, rat that have died from eating poisonous bait, the carcass is not known, so it often disturbs the occupants of the house because of the smell. In addition, rat poison is also dangerous for humans themselves, especially children who may not know the use of these ingredients and are also dangerous for other pets such as dogs and cats that can be wrong targets of bait containing the rat poison.

The distribution of traps to the community as a stimulant has been carried out by the Demak District Health Office in an effort to reduce the incidence and risk of leptospirosis transmission. This good measure should continue to be maintained and developed by activating the role of cadres and community leaders to play a role in socializing leptospirosis along with its causes, modes of transmission, and all related risk factors. Increased knowledge and public awareness about leptospirosis in both endemic areas and regions that have been considered

free of the disease, is one of the basic steps that are important in the effort to control leptospirosis. The few respondents in this study who have never heard of leptospirosis or other names, need to be followed up with an increase in socialization to the lowest levels of society. Various forms of activities and socialization media can be used, not only in the form of leaflets or banners, because not everyone likes or wants to read. Media socialization in the form of documentary films or talk shows, or information inserted in the activities of associations of fathers, mothers, study forums, teaching and learning activities in schools or youth associations can be considered as an alternative effort to control leptospirosis.

According to WHO, transmission of leptospirosis from animal reservoir carrier to humans is not only through direct or indirect contact. The existence of a small body wound that is often unconscious or underestimated can be an entry point for leptospira bacteria.<sup>16</sup> Contact with contaminated water alone does not contribute large enough to allow the transmission of leptospirosis. This contact needs to be supported by the presence of a wound and the amount of liquid that can contaminate. The existence of wounds is not always realized by humans except for large wounds. Contact with sources of transmission supported by the presence of wounds will increase the risk of contracting leptospira bacteria. The combination of interventions between prevention of indirect contact between healthy humans and water contaminated with leptospira bacteria and wound care can reduce the rate of leptospirosis transmission in humans. The results of Sakundarno's study which showed that increasing the knowledge of the community to recognize the wounds on his body and how to care for him, need to be considered.<sup>17</sup> Prevention of contact with contaminated water is carried out by preventing contact with water in the environment, for example by using footwear, boots if carrying out activities related to stagnant water for a long time, for example when farming or gardening or perhaps working to clean the environment, including when doing "Gropyokan" (rat raid together) and when passing through flood and rob (flood of sea water) areas that often occur in Demak and become one of the important risk factors in Demak. Giving disinfectant or chlorination to water which is suspected to be a medium of transmission can also be done, but by fulfilling the requirements and procedures that have been determined according to health and the environment.

Efforts to control rat need to be supported by prevention of contact with contaminated water, wound care, and the management of household waste properly, so that it returns to the importance of awareness and habits to behave in a clean and healthy life, including the simplest, that is diligently washing hands with soap and using footwear while outdoors.

WHO states that there are two things that need to be considered in controlling rats in a home environment, namely eliminating the necessities of life and making or completing the structure of a house with anti-mouse materials.<sup>18</sup> The presence of domestic waste in the house that is left to collect not in a closed container or trash can increase the presence of rats in the house. Management of domestic waste in the home needs to be considered to be properly closed and the frequency of discharge outside the house is quite often done. Another limitation in this study is the neglect of raw materials such as grain (harvest) stored in the house, which can also increase the presence of rat in the house.

By increasing good cooperation between the Health Office and the Agriculture Service, especially in the field of animal husbandry, digging deeper into the results of research and surveys related to information on livestock populations that can become reservoirs of leptospirosis such as data on the number of cows, horses, goats and pets such as dogs and cats in Demak Regency will greatly complement the concept of leptospirosis control model with system dynamics. The results of Warbal's study in 2010 showed that 5% of cats caught in Tridonorejo Village, Bonang District, Demak Regency, were positive for Leptospira.<sup>19</sup> In addition, in this study, the discovery of pomona serovar which is a leptospira serovar in hosts in the form of livestock such as cattle and horses, which was then associated with the results of epidemiological investigations which showed a relationship with the type of work of the patient as a driver or driver Delman, indicating the possibility of a contribution livestock and domestic animals as leptospirosis reservoir in Demak Regency. Another limitation in this study is that there is no blood sample of horses that experience eye pain, which is also kept in the same cage as the pet horse of the sufferer, because the owner is not permitted. Research in the United States in 1999, showed that one of the clinical symptoms of leptospirosis in horses is uveitis which can cause blindness in the eye.<sup>20</sup>

The results of interviews and observations in this study indicate that not all case data reported during 2011 - 2013 were followed up with epidemiological investigations in the field. Fast, good and integrated coordination between various related parties, both government and private, starting from the first service unit, namely puskesmas and hospitals both in Demak Regency and in areas outside Demak Regency where Demak residents get diagnosis and treatment related to leptospirosis, to Dinas Provincial Health, needs to be improved. One reason for not carrying out an epidemiological investigation into the reported cases, because the patient was examined and received a diagnosis and treatment at a hospital outside the Demak area, then the hospital did not deliver the data to the Demak District Health Office quickly, but the data was new Central Java Provincial Health Office officials obtained data collection as an annual report. The time needed to find out the case data by the Demak District Health Office is long enough, so that epidemiological investigations are felt to be inaccurate and effective to do considering the possibility of bias in the data from interviews and observations. The socialization and training of standard standards for determining the right and fast diagnosis for leptospirosis sufferers and the mechanism of the leptospirosis case reporting system need to be carried out routinely through various meetings involving various parties and related sectors. Periodic changes in leptospirosis management officers need to be accompanied by periodic socialization and refreshing of leptospirosis.

There were some limitation of the study. Diversity of sources can increase the required data source but on the other hand can cause shortcomings for this study. Various sources could be because it includes the source of the results. Beside that, limited of data; limited of leptospirosis' study also become research obstacles. Formulation and simulation techniques require skill, perseverance and experience. Furthermore, the study can not be evaluated whether the results are in accordance with the predicted, or if there are deviations how big the deviation. In addition, cost estimates of intervention activities are only rough, do not use socioeconomic calculations or analysis.

## CONCLUSIONS

Factors that influence the control of leptospirosis according to causal loop diagram that is preventing contact with urine of infected mice, controlling mice,

reducing or managing waste properly so as to reduce food availability for mice, and treat wounds. The most influential factor in reducing the incidence of leptospirosis is direct contact with the urine of infected mice. But, technically, practically and economically, domestic waste management was possible.

The availability of routine and complete data on leptospirosis risk factors is needed to increase the validity of the control model with system dynamics. The model was a useful tool to predict the efficiency of leptospirosis control under various intervention scenarios.

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**Conflict of Interest:** There was no conflict of interest of this study.

**Ethical Clearance:** Before the study begins, this research has received ethical approval from the Ethics Committee of the Health Research and Development Agency of the Ministry of Health of the Republic of Indonesia.

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# Maternal Height as an Determinant Factors of Children not to be Stunting Until Age 59 Months

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## ABSTRACT

**Background:** Early growth disorders influence the occurrence of stunting, which in turn is at higher risk of obesity at later ages. Maternal height, birth weight and length birth might affect the child growth not to be stunting.

**Objective:** We examined the proportion and hazard risk the resilience not to be stunting of children since birth to 59 months of age according to birth weight, length birth and maternal height controlled with other factors.

**Method:** We have performed Life table and Cox regression on 859 children 59 months age from Bogor child growth and development cohort study. Child growth and covariates data were collected every month since infant birth until the age of 59 months.

**Results:** Maternal height is a significant risk for children stunting until age 59 months after adjusting by sex, exclusive breastfeeding, immunisation, birth weight, length birth, gestation age, maternal age, parity, pre-pregnancy weight. The proportion of children who survive did not become stunting of the mother with height 150 cm or above (49 per cent) more significant than children of the mother with a height below 150 cm (28 per cent). The proportion of children which are not stunting at 23 months of age was no different than at 59 months of age for all risk factors.

**Conclusion:** Pre-pregnancy BMI, maternal height, birth weight and length birth is a determinant factors child who survives not to be stunted from birth to 59 months.

**Suggestion:** Nutrition intervention for children with the mother's height less than 150 cm should be done since fetus until the age of child 59 months especially for thousand days

**Keywords:** children, maternal, height, stunting

## INTRODUCTION

Stunting affects one-third of children under five y old in developing countries, and 14% of childhood deaths are attributable to it<sup>[1]</sup>. Indonesia as a developing country, during seven years the prevalence of stunting under five children still stagnant at around 37 per

cent (2007 to 2013)<sup>[2],[3]</sup>. Globally, the prevalence of Indonesia children of stunting was number five in the world<sup>[4]</sup>. Stunting children has a high risk to become obesity in later age. It is a reason, globally and national levels were the commitment to reduction malnutrition<sup>[5]</sup>, especially for stunted children Global Nutrition Targets 2025 is 40% reduction in the number of children under-5 who are stunted<sup>[6]</sup>.

Many studies demonstrated the prolonged effect of stunting in early life, especially at below two years old age<sup>[7]</sup>. Early life contribution to long-term health. Maternal height influences offspring linear growth over the growing period<sup>[5]</sup>. These influences likely include genetic and non-genetic factors, including nutrition-

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related intergenerational influences on growth that prevent the attainment of genetic height potential in low- and middle-income countries<sup>[8]</sup>. One-third of pregnant women are short with height less than 150 cm<sup>[9]</sup>, and this is probably related to the prevalence of children under five years of stunting in Indonesia by 37,2 per cent<sup>[9]</sup>. Utami has reported that nutritional status at birth (weight and length of birth) and little mother high, is a dominant risk factor which affects stunting among children age 0-23 months. This research has found it the resilience of children to survive not stunting decreases with age increase<sup>[10]</sup>. The process of becoming stunting start in utero, even until 2-3 years of age child not stunting. A very short height – usually reflects the persistent, cumulative effects of poor nutrition and other deficits that often span across several generations<sup>[7]</sup>.

This article is a continuation of the analysis that has been done by Utami in the same location and some of the same respondent, which is to assess the resilience of children not be stunting in children aged 0-59 months and factors that influence it. The influence of the environment on the growth of the child increases with the age of the child<sup>[10]</sup>. The objective of this article is to assess whether mother's nutritional status and weight and length of birth still affect the resilience of children not to be stunting at age 0-59 months.

## METHOD

**Data source:** The dataset obtained from data The Bogor Longitudinal Study on Child Growth and Development (BLSCGD) was conducted in Bogor Tengah sub-district, Bogor city, Indonesia. This study conducted since 2012 which is still ongoing. The BLSCGD will cover a sample of 2170 pregnant women by 2030. The analysis in this articles focuses on children aged 0 - 59 months.

**Population and samples:** The sample size was calculated using formula two population proportions by assuming the proportion<sup>[12]</sup> of stunting to be 37,2 per cent<sup>[3]</sup>, with a 5 % level of significance, a power 80 %. The total sample size needed to analyse was 764 children. Since 2012 to 2017, the total respondent was 1089 child, and 859 respondents eligible for analyses. An inclusion criterion is respondent (pregnant women and children) are willing to take BLSCGD study until the child is 18 years old. The exclusion criteria are children with physical disabilities such as cleft lip and polio. Respondents signed the consent form before they are joining this research.

**Data collection:** Data collected every month are anthropometry (height and weight), breastfeeding, immunisation status, morbidity, health-seeking behaviour, child growth monitoring, healthcare and eating patterns. As a Utami et al. mentioned, the overall objective of BLSCGD to evaluate determinants factors of child growth and development from birth until aged 18 years. Data collection began in 2012 and is still ongoing. Recruitment of pregnant women aged 15 - 45 years by the community health volunteers (Kader) for each area<sup>[10]</sup>. Methods of collection data according to BLSCGD study<sup>[13],[15]</sup>.

Subjects were interviewed using a questionnaire for socioeconomic characteristics. Anthropometric measurements (weight, height) were taken. Clinical examination by a medical doctor was undertaken each month of pregnancy<sup>[10]</sup>. Weight and length birth were measured within 24 hours of birth. Birth weight was categorized as 'low' if <3,000 g<sup>[14],[10]</sup>, while the birth length was categorised as 'short' if <50 cm<sup>[3],[10]</sup>. Maternal height was categorised as 'at risk' if it was less than 150 cm<sup>[3],[15],[10],[16],[17]</sup>.

Mother's education achievement level was categorised as 'low education' (below junior high school) and 'high education' (senior high school or above). Mother pre-pregnancy body mass index (BMI) was calculated from weight and height, and categorised into 'underweight' (BMI <18.5 kg/m<sup>2</sup>) and Normal-overweight-obese ( $\geq 18.5$  kg/m<sup>2</sup>)<sup>[9],[10]</sup>.

Measurements weight using AND digital weighing scale accuracy 50 gram and capacity 200 kg. Length or height measured using multiple measuring boards, accuracy 0,1 cm and capacity 2 meters. Children 2 years or below were measured lying down position (recumbent length), and standing height was measured for older children. Children with height for age Z-score below minus two standards deviations (-2 SD) from the median of the WHO reference population are considered to be stunted (World Health Organization in 2007). The immunisation status of children referred to the compulsory immunisation of children up to the one year of age. Fully immunised refer to government rules.

Health-seeking behaviour is the practice of mothers who seek health services when the child was sick, during the first six months. Child growth monitoring

was based on the date of childbirth and the regularity each month. Children were considered to have ‘regular growth monitoring’ if every month since birth is weighed monthly. Exclusive breastfeeding practices determine used variables patterns, pre-lacteal feeding, current breastfeeding and complementary food, which is collected used 24-hour recall data. They are categorised as ‘exclusively breastfed’ if they got the only breast during the first six months of life (WHO, 2008). Morbidity was determined to the frequency of illness every six months period (0-5 months, 6-11 months, 12-17 months and 18-23 months)<sup>[10]</sup>.

Data collected by enumerators (diploma of nutrition, nurse and midwives). Enumerator training is conducted regularly twice per year. Every month on the same date (according to date of birth, the respondent comes to the base camp for measurement and interviewed. If the respondent was unable to attend on that date, then there was an allowance to go three days before or three days after the specified date<sup>[10]</sup>.

Child survival resilience toward not to be stunting was analysed by using the survival statistic test using life table and Kaplan Meier. In this analysis, ‘case’ was the occurrence of stunting. The time variable in this analysis was the time (in months) when the children became stunted. Factors affecting stunting were tested using Cox Proportional Hazards Regression. We did a multicollinearity assessment of the independent variables before running the regression analysis<sup>[10]</sup>.

## RESULTS AND DISCUSSIONS

A one- third of children are born to weight less than 3000 grams, and nearly two-thirds of children with a length birth are less than 50 cm. The proportion of mothers at risk ages (<20 years and > 35 years) by nearly twenty per cent. One- third of m with height less than 150 cm, and two-fifths with thin nutritional status (BMI <18.5 kg / m<sup>2</sup>). About a quarter of children get exclusive breastfeeding. More than three-quarters of children are entirely, and children are routinely weighed into Posyandu every month. Two-thirds of respondents seeking health services when sick. Two-fifths of mothers with low education (Junior High School down), and most mothers do not work (table 1)

**Table 1: Characteristics mother and under-five children (n = 859)**

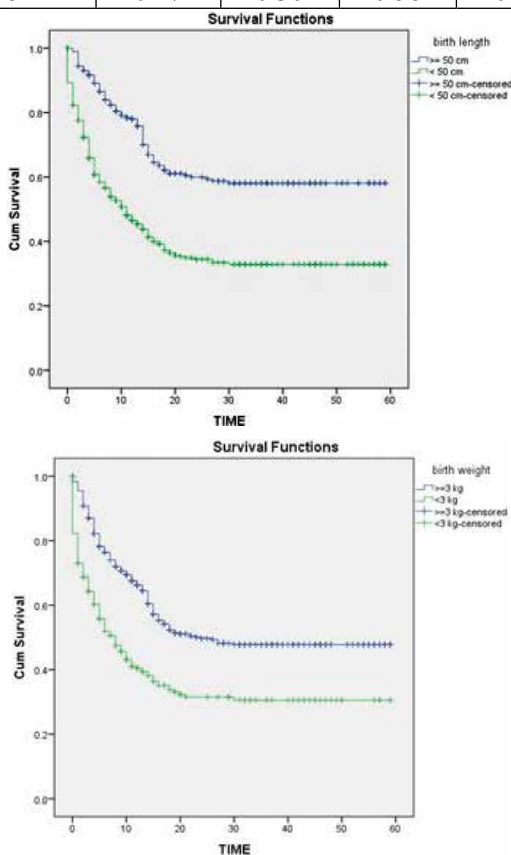
Factors	n (%)
<b>Sex</b>	
Boys	390 (45,4)
Girls	469 (54,6)
<b>Birth Weight</b>	
< 3000 gram	281 (32,7)
≥ 3000 gram	578 (67,3)
<b>Length Birth</b>	
<50 cm	550 (64,3)
≥ 50 cm	306 (35,7)
<b>Mother age</b>	
< 20 years and > 35 years	158 (18.4)
20-35 years	701 (81.6)
<b>Mother Height</b>	
< 150 cm	286 (33,3)
≥ 150 cm	573 (66,7)
<b>BMI Mother (Pre Pregnancy) (kg/m<sup>2</sup>) (N = 836)</b>	
Underweight (<18,5)	105 (12,5)
Normal-overweight - obesitas (≥18,5)	735 (87,5)
<b>Exclusion Breastfeeding 0-6 bulan (N = 613)</b>	
Yes	473 (77,2)
No	140 (22,8)
<b>Immunization (N = 613)</b>	
Yes	79 (12,9)
No	534 (87,1)
<b>Routine weighing in Posyandu (N = 614)</b>	
Yes	65 (10.6)
No	549 (89.4)
<b>Health seeking (N = 596)</b>	
Health Facility	183 (30.7)
Nin Health Facility	413 (69.3)
<b>Education of Mother (846)</b>	
Low	389 (45.4)
High	467 (54.6)
<b>Work status of Mother (858)</b>	
Work	136 (15.9)
No	722 (84.1)

There is no difference between the resilience of stunting incidence in boys and girls from birth to age 59. At the age of 0 months 60 per cent of children are not stunting and at the age of 59 months becoming 40 per cent (data not shown). Children born weighing ≥ 3000 grams or children born with long births ≥ 50 cm more resistant not to be stunting. The survival rate of stunting incidence at 0-11 months of age in children with less than 50.0 cm birth weight decreased dramatically. This continues until the age of 20 months. Resistance

to stunting in both groups of children tended to remain from the age of 20 months to the age of 59 months. At the initial interval of life 0-5 months, the proportion child not stunting is higher in children born <50.0 cm (39 per cent), whereas in children born  $\geq 50.0$  cm only 11 per cent. From the age of 30 months the of children not stunting who's born  $\geq 50$  cm is almost twice than children who are born with length <50 cm.

**Table 2: Life tables for surviving not stunting by weight and length birth**

Interval start time	Birth Weight		Length Birth	
	$\geq 3$ kg	< 3 kg	$\geq 50$ cm	< 50 cm
0	0.78	0.56	0.89	0.61
6	0.67	0.41	0.78	0.48
12	0.54	0.35	0.63	0.39
18	0.50	0.31	0.60	0.34
24	0.48	0.31	0.58	0.33
30	0.47	0.30	0.58	0.32
36	0.47	0.30	0.58	0.32
42	0.47	0.30	0.58	0.32
48	0.47	0.30	0.58	0.32
54	0.47	0.30	0.58	0.32

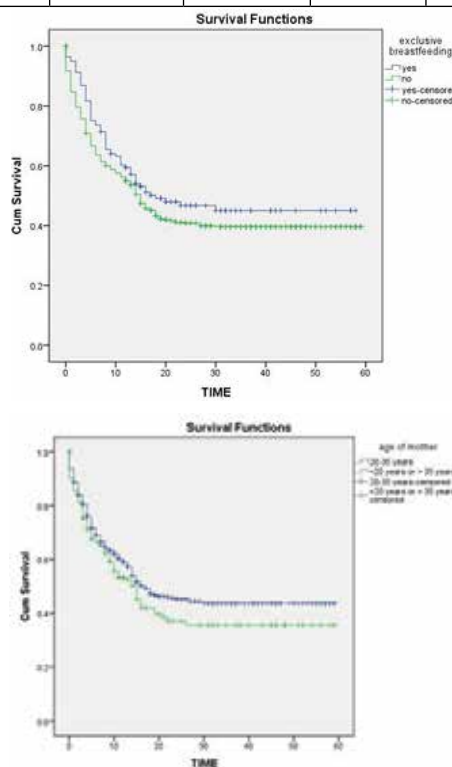


**Figure 1: Resistance not to be stunting incidence of children aged 0 - 59 months by Weight and Birth Length (Kaplan Meier analysis)**

Table 3 and Figure 2 shows that starting 0 months to 59 months there was no difference for survival not stunting between maternal group aged and exclusive breastfeeding. Children have survived to not stunting in who's have mother age 20-35 years more than who's have mother age < 20 years and  $\geq 35$  years, which is almost the same for children with exclusive breastfed.

**Table 3: Life tables for the proportion of children not to be stunting based on exclusive breastfeeding and mother age**

Interval start time	Cumulative Proportion Surviving at the end of Interval			
	Exclusive breastfed		Mother Age	
	Yes	No	20-35 y	< 20 and > 35 y
0	0.75	0.67	0.72	0.67
6	0.60	0.56	0.60	0.53
12	0.50	0.45	0.49	0.42
18	0.47	0.41	0.45	0.37
24	0.47	0.40	0.44	0.36
30	0.44	0.39	0.43	0.36
36	0.44	0.39	0.43	0.36
42	0.44	0.39	0.43	0.36
48	0.44	0.39	0.43	0.36
54	0.44	0.39	0.43	0.36



**Figure 2: Resistance not to be stunting of children aged 0 - 59 months according to exclusive breastfed and mother age (Kaplan Meier analysis)**



**Table 4: Life tables for the proportion children not to be stunting based on mother height and pre-pregnancy BMI**

Interval start time	Cumulative Proportion Surviving at the end of Interval			
	Height		Pre-Pregnancy BMI	
	≥ 150 cm	<150 cm	≥ 18,5 kg/m <sup>2</sup>	< 18,5 kg/m <sup>2</sup>
0	0.76	0.61	0.72	0.66
6	0.65	0.46	0.60	0.52
12	0.55	0.33	0.49	0.38
18	0.51	0.29	0.45	0.35
24	0.50	0.28	0.43	0.35
30	0.49	0.28	0.43	0.35
36	0.49	0.28	0.43	0.35
42	0.49	0.28	0.43	0.35
48	0.49	0.28	0.43	0.35
54	0.49	0.28	0.43	0.35

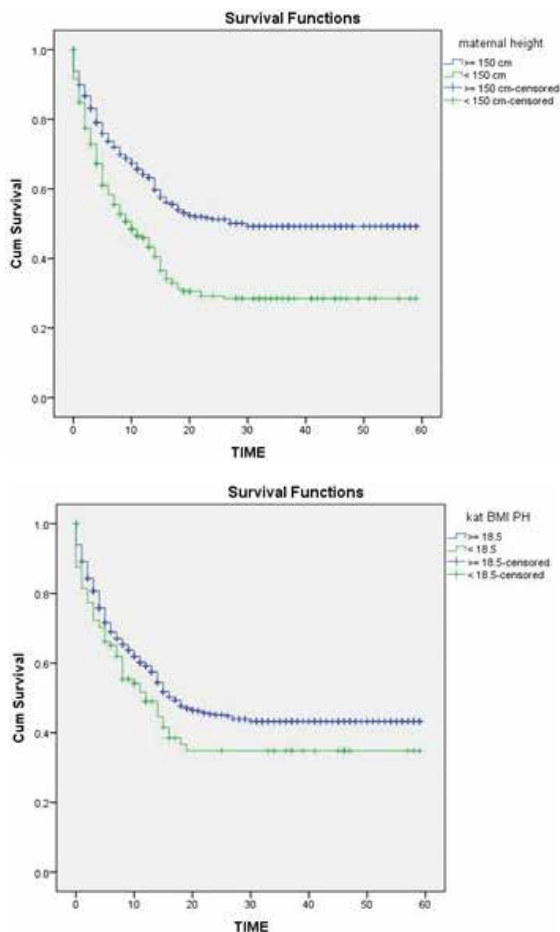
**Determinant factors of stunting in children aged 0-59 months:** Variable included in a multivariate test using Cox Proportional Hazards Model is p-value <0.25. Table 5 shows mothers with height <150 cm is at higher risk of child stunting and mother. Mothers with pre-pregnancy BMI <18.5 kg m<sup>2</sup>/kg are at higher risk of stunting. Also, a mother with parity > 2 children is the more significant risk to stunting, and gestational age < 37 weeks are a more significant risk to stunting. Childbirth weight < 3000 gram are a higher risk of stunting than childbirth weight ≥ 3000 gram. Also, childbirth weight < 50 cm are a more significant risk to stunting than childbirth weight ≥ 50 cm.

**Table 5: The determinant factor of stunting children at age 0–59 months (N = 859)**

Factors	Analysis multivariate cox regression		
	Hazard ratio	95% CI	P value
<b>Sex</b>			
Boys	1,027	(0,827–1,277)	0,808
Girls			
<b>Birth Weight</b>			
< 3000 gram	1,433	(1,126–1,823)	0,003**
≥ 3000 gram			
<b>Length Birth</b>			
<50,0 cm	1,994	(1,545–2,572)	0,000**
≥ 50,0 cm			
<b>Exclusif Breastfeeding 6 months</b>			
No	1,187	(0,910–1,548)	0,206
Yes			
<b>Mother height</b>			
< 150 cm	1,644	(1,295–2,085)	0,000**
≥ 150 cm			
<b>Gestation ages</b>			
< 37 minggu	1,277	(0,959–1,683)	0,082*
≥ 37 minggu			
<b>Parity</b>			
>2 orang	1,231	(0,973–1,558)	0,083*
≤2 orang			
<b>Pre Pregnancy BMI of Mother</b>			
< 18,5 kg/m <sup>2</sup>	1,481	(0,967–2,269)	0,071*
≥ 18,5 kg/m <sup>m</sup>			

\*\* significant p<0,005, \* significant p<0.100

The main finding was maternal height, pre-pregnancy BMI, birth and length birth as a risk factors child to stunting since 0 to 59 months, confirming that variables persistent since age 23 month<sup>[10]</sup>. The proportion of children not stunting from 23 months to age 59 does not change by birth weight, birth length,



**Figure 3: Resistance not to be stunting of children aged 0 - 59 months according to mother height and pre-pregnancy BMI (Kaplan Meier analysis)**

mother's height and pre-pregnancy BMI. This proves that the first 1000 days of life play a role in the event of stunting<sup>[1]</sup> and a later age a growing child's environment is more influential<sup>[11],[18]</sup>. During 1000 first life, maternal pre-pregnancy BMI and weight gain during pregnancy as an indicator of reserves for fetal growth<sup>[19]</sup> which further affects the low birth weight and the length of birth<sup>[20][14]</sup>. Other research in West Java, Indonesia also proved that birth weight and length birth as most essential determinants of linear growth<sup>[21]</sup>. Low birth weight as a dominant factor of child stunting for 12-23 months<sup>[22]</sup>, Therefore stunting prevention is focused on intervening during the first 1000 day. It remains that globally the bulk (70%) of the total deficit at five years is caused growth faltering during the first 1000 d. Also, better nutrition, health, and care during the first 1000 d may (at least partially) help avert continued faltering beyond age two years<sup>[16]</sup>

Intergenerational effects are evident in this study since the proportion of short children of mothers with <150 cm of height is more significant than children of mothers with a height of  $\geq 150$  cm. Result study in India showed that LBW infants born to mothers with height  $\leq 150$  cm had a comparatively higher risk of stunting with lower attained LAZ scores in their infancy, compared to those born to mothers with height  $\geq 150$  cm, after adjusting for all potential confounding factors<sup>[17]</sup>. Mothers who start pregnancies with low nutritional status make it possible to achieve less weight gain, which occurs in low birth weight babies as a study in West Sumatera. The majority of women gained low weight during pregnancy compared to the Institute of Medicine (IOM) recommendations, especially those who had a healthy BMI<sup>[19]</sup>.

After a 2-year-old child, the environment grows especially the behavior of the child's nutritional status<sup>[11],[23]</sup>, such as drinking water from unsafe source, occasionally eating animal source food, acute respiratory infection, RI in the past two weeks, late initiation of breastfeeding after one hour after birth, and lack of vaccination were significantly associated with stunting among child 6 – 59 months<sup>[23]</sup>. Although this study did not prove significant, there is a tendency of children who get exclusive breastfeed more who can survive no stunting from birth to 59 months. Therefore, an infant needs exclusive breast milk in their first six months. Afterwards, they need complementary food with sufficient quantity and quality<sup>[4]</sup>.

## CONCLUSIONS

Pre-pregnancy BMI, maternal height, birth weight and length birth is a determinant factors child who survives not to be stunted from birth to 59 months.

The proportion child not to stunting almost same from 23 months to 59 months for pre-pregnancy weight, maternal height, birth weight and length birth.

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# A Community-Based Study on the Association *Helicobacter pylori* seropositive to upregulate Cyclooxygenase 2 (COX2) Expression

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## ABSTRACT

*Helicobacter pylori* infection can induce chronic inflammation and impact to release NFkB, and other pro inflammatory cytokine such as cyclooxygenase 2 (COX2). COX2 is a catalisator enzyme to arachidonic acid metabolism. Increase expression COX 2 lead to manifestation of extragastric. Acute *Helicobacter pylori* inflammation wheather also can induce upregulate express ion of cyclooxygenase 2 (COX2) is still unclear. This study aimed to evaluate wheather acute *Helicobacter pylori* infection also can induce upregulate expression COX 2. This research was cross-sectional study conducted from march to june 2018. The inclusion criteria were an age between 17-19 years girl, post menarche, and absence of pregnancy. Ultimately, 105 girl were enrolled in this study. Our procedure is an advance onn current methods and useful ELISA measurement of Ig M and Ig G antibodies diagnosed with *Helicobacter pylori*. ELISA measured serum Cyclooxygenase 2 (COX2) level. Among the subjct, forty-five (42.8%) had been diagnosed with *Helicobacter pylori* infection based on Ig M *Helicobacter pylori* seropositive. Otherwise Ig G *Helicobacter pylori* seems to be normal. The subjects with *Helicobacter pyori* infection had higher mean COX 2 than those without *Helicobacter pylori* infection ( $2.5 \pm 1.1$  vs  $0.6 \pm 0.4$ ,  $P = 0.001$ ). This study can conclude that subjects with *Helicobacter pylori* infection may increase a risk of upregulate COX 2 even in acute inflammation. this results will give a new understanding about pathophysiology of *Helicobacter pylori* infection.

**Keywords:** *Helicobacter pylori*, Ig M, Ig G, COX 2

## INTRODUCTION

*Helicobacter pylori* (*H.pylori*) is a gram-negative microorganism found in the human gaster. Chronic infection with *H.pylori* will induce an immune response and result in local gastritis or systemic response(1–4). In recent studies, *H.pylori* was also found to be associated with some extradigestive diseases, such as cardiovascular disease, hormonal disorders and reproductive disorders including menstrual pain problem (1,4,5). The mechanism associating *H.pylori* infection and extra

gastric manifestation may be related to immunological cytokines and mediator of inflammation(1,4,6,7).

The prevalence of *H.pylori* is approximately 50-60% all over the world and about 60-70 % in Indonesia (8). *H.pylori* infection can induce changes in gastric epithelial to colonize (9,10). Most patients get *H.pylori* infections during childhood.

Gastric inflammation is highest with cytotoxin-associated gene A (cagA) strain of *H. pylori* (10–12). Chronic inflammation by *H. pylori* infection can induces the upregulate COX 2 through NFkB (6). Cyclooxygenase 2 (COX 2) is a key mediator inflammation that involved in development of gastric cancer (13,14). But the other hand, COX 2 is an enzyme that change arachidonic acid to their metabolit which is prostaglandin (15).

Recent studies have reported the wide range action of prostaglandin, such as fever, pain in dysmenorrhea

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primer, allergy, immune system, blood pressure, atherosclerosis, cardiovascular disease that is a public health problem in Indonesia (8,16,17). It still lack study for association between *H. pylori* infection and prostaglandin. It is necessary accurately adjust the molecular action to evaluate the association between *H.pylori* and prostaglandin that can revealed previously unknown pathway. We hypotesized that colonization with *H.pylori* is ssoociated with a change in prostaglandin due to chronic inflammation and that COX 2 is involved.

**METHOD**

This study was performed in student girl aged 17-19 years who had studied at the Nasional Institute of Health Science, from March to July 2018. We take 105 subjects were enrolled in this present study (mean age 18.05±0.9) with healthy condition by laboratory and phisical check up who voluntarily participated as subjects in this study. All procedures were approved by the Ethics of Committee of Moewardi Hospital. Each method and the potential risks were explained to the participants in detail, and all subjects gave written informed consent before the study.

In a cross-sectional study, we determined the presence of *H.pylori* infection was determined and evaluated the level of anti-*H. pylori* immunoglobulin M by a serum *H. pylori* antibody detection kit (PLATOS R496, AMP Diagnostics). We determined COX 2 using ELISA method (Elabscience®).

Statistical analysis was used with SPSS 20.0 statistical package (SPSS Inc., Chicago, IL, USA). The Kolmogorov-Smirnov test had used to assess whether continous data were normally distributed. Continous variables has been presented the mean and standard deviation. T-test was applid for comparing the mean values of two samples. Pearson Correlation test had used to determine the association between *H. pylori* infection and COX 2 and also with PGE 2. Regression linier analysis had used to evaluate the risk factors for increase COX 2 and PGE 2 serum level (backward: Wald; cutoff for entry : 0.05, for removal 0.10). if the differences with P-value of <0.5 was considered to indicate a statistically significant.

**Table 1: Characteristics of the study subjects (n = 105)**

	mean	p
Age	18.05 ± 0.9	P = 0.061
Body weight	47.6 ± 7.9	P = 0.052

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Body height	154.5 ± 6.0	P = 0.336
<i>H.pylori</i> infection	1.91 ± 1.2	P = 0.1
COX 2	1.48 ± 1.2	P = 0.061

**RESULTS AND DISCUSSIONS**

A total 105 subjects which were student girl enrolled in this study with age 17-19 years ( mean age 18.05±0.9). Charateristics subjects acording to continous variable are ilustrated in Table. 1. Among the subjects, 45 (42.8%) were diagnosed with *H. pylori* infections. Caharacteristics subjects according to categorical variable are ilustrated in Table. 2.

The subjects with *H.pylori* infection had higher mean COX 2 than those without *H.pylori* infection ( 2.5 ± 1.1 vs 0.6 ± 0.4 , P = < 0.001). See at Table. 3

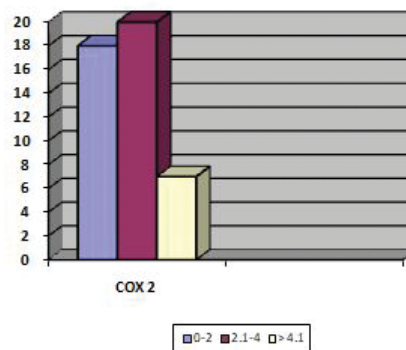
**Table 2: Characteristics categorical vriable (n = 105)**

Variable	f	%
<i>H.pylori</i> (+)	45	42.8
<i>H.pylori</i> (-)	60	57.2

As shown in Table 4, Pearson corelation r between *H. pylori* and COX 2 is 0.97 (p = 0.01), which mean there are a strong correlation between *H. pylori* and COX 2 serum level. Higher level of Ig M *H. pylori* causes increase serum COX 2 level.

**Table 3: The mean COX 2 values of the subjects with and without *H. pylori* infection**

	<i>H. pylori</i> (+)	<i>H. pylori</i> (-)	P
COX 2	2.5 ± 1.1	0.6 ± 0.4	< 0.001
Body weight			
Body Height			



**Fig. 1: Association between COX 2and the prevalence of *h. pylori* infection**

Linier regression analysis was performed to evaluate the most strong variable that associated with increase level COX 2 serum. The variables included age, body weight, body height and Ig M *H. pylori*. The results showed that Ig M *H. pylori* is the most variable that associated to increase COX 2 serum level, which is higher serum Ig M *H. pylori* level will cause increase COX 2 serum level (p= 0.01). Variable body weight has no association with COX 2 (p=0.1). Variable body height has no association with COX 2 (p=0.3). Variable age has no association with COX 2 (p=0.6). (Table 5).

**Table 4: Association between *H. pylori* dan COX 2**

Variable	n	mean	Pearson Coefficient Corelation	P
H. pylori	105	1.91 ± 1.2	0.97	0.01
COX 2	105	1.48 ± 1.2		
Body weight	105	1.91 ± 1.2	0.15	0.1
COX 2	105	1007.8 ± 819.8		
Body Height	105	1.48 ± 1.2	0.08	0.3
COX 2	105	1007.8 ± 819.8		

As illustrated in figure 1, showed that higher level COX 2 at the indeks Ig M range 2.1-4 ( seropositive). *H. pylori* was the most variable that more prevalence in the increase COX 2. (Figure 1)

**Table 5: Association between *H. pylor* and COX 2**

Variable	B	t	R Square	P
age	0.012	0.38		0.7
<i>H. pylori</i>	0.93	47.8	0.95	<0.001
BMI	0.06	35.8		0.4
Body weight	-0.026	-2.04		0.5
Body Height	0.014	-0.32		0.4

*Helicobacter pylori* is bacterium that cause the most prevalence infection in the world, almost 50 % population (18,19). It cause dyspepsia, cute gastritis, chronic gastritis, peptic ulcer, MALT-lymphoma and gastric adenocarcinoma (3,10). The most virulent strain of *H.pylori* that identified by the presence of cytotoxin-associated gene A (cagA) cause peptic ulcer and gastric carcinoma (4,10).

Recent studies reported the link *H.pylori* infection with manifestation outside from the gaster. More study have been conducted to explore the role of *H. pylori* in cardiovascular disease, insuline resistance, metabolic syndrome that also public health problem (1,4,5).

Extra gastric manifestation of *H.pylori* infection related to chronic inflammation that mediated by NFkB dan COX 2 as a key mediator inflammation. From this, several cytoines and other mediator inflammation to be upregulated (6).

In the current study, 42.8% of the subject were *H. pylori* infection. There is a strong relationship between *H. pylori* infection and increase COX 2 (Tabel 4). Sierra et al. found that *H. pylori* induced COX 2 expression. Akhtar et al. also reported that *H. pylori* stimulate the expression of COX 2 (6,20).

COX 2 is an enzyme promote arachidonic acid into thier metabolite which is prostaglandin. Our data significantly confirm this relationship between COX 2 and PGE. (Tabel 5). COX 2 is the most influences variable that increase PGE 2. There have not any study yet that reported this.

Our data suggested that *H. pylori* infection was significantly linked with the increase PGE 2 (Tabel 4). The mean PGE 2 was higher in subjects with *H. pylori* infection thang those without *H. pylori* infection (Tabel 3).

It might be explained by molecular mimicry that infectious agents may lead to immune reponse that induce chronic inflammation by a variety mechanisms., such as inducing modification of antigen, alteration of the idiootype network, activation of polyclonal T cells (5,21,22).

The additional information provided by this study is that the effect of body weight on decrease PGE 2 serum level. More higher body weight cause more decrease of PGE 2 (Tabel 5).

In conclusion, our findings indicate that *H. pylori* infection significantly associated with increase PGE 2. This findings will explore the other pathway about extra gastrix manifestation of *H. pylori* infection especially to cardiovascular disease, insuline rsistance and metabolic sydrone. Therefore, it become to be preventif effort to public health problem.

## CONCLUSIONS

*Helicobacter pylori* seem to be infected in early age or teenagers. This can be observed in Ig M *H.pylori* increase without increase Ig G *H.pylori*. *Helicobacter pylori* seropositive Ig M may increase risk of upregulate expression COX 2. It seems that increase serum COX 2 level already happens in acute infection of *Helicobacter pylori*.

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**Conflict of Interest:** There no conflict of interest taht relevant to this article was reported.

**Ethical Clearance:** All procedures performed in studies involving human participants were in accordance with ethical standards of the institutional and/or national research commitee and with the 1964 Helsinki declaration and its later amendments or comparable ethic standards. The Institutional review Board of the Moewardi Hospital approved this research. All participants agreed to the study conditions and provided informed consent before the enrollment in this study.

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# Individual Characteristic and Cadmium Level in Blood on Tradisional Metal Foundry Workers

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## ABSTRACT

Cadmium is one type of seriously hazardous heavy metal if inhaled. Acute cadmium poisoning may result from exposure of cadmium oxide vapor during metal melting process. This study aims to determine the factors of individuals characteristic associated with levels of cadmium in the blood of workers. This research is an analytic observation research with cross sectional approach. Samples were taken purposively from 30 metal casting workers. The research variables are smoking habit, BMI, working hours, duration of work and occupation as independent variables and cadmium levels in the blood as dependent variables. Blood cadmium levels were measured using Atomic Absorbtion Spectrophotometer (AAS). Data were analyzed using chi-square. Although there was no correlation between smoking habit and working hours on cadmium blood level ( $p$  value  $> 0,05$ ) but there was correlation between nutritional status, duration of work and occupation to cadmium in blood ( $P$  value  $< 0.05$ ). There is a relationship between BMI, duration of work and type of work with cadmium levels in the blood of metal casting workers, for modification of workplace ventilation and the use of personal protective equipment to increase fume of cadmium in workplace.

**Keywords:** *cadmium in blood, metal casting, individual characteristics*

## INTRODUCTION

Metal foundry industry is one of the industries producing pollutants that can pollute the environment. Sources of emissions of pollutants that exist among them are particles in the form of dust derived from metals such as lead, nickel, cadmium and beryllium<sup>1</sup>.

In the process of casting melting of raw materials is done at  $\pm 13000C$ . At this stage smoke and vapors produced are contained of metal particles (fume) consisting of unused metal powder finishing, steel, silicon, slag and carbon. This is exacerbated by the lack of adequate ventilation to cause workers inhaling the combustion gas continuously<sup>2</sup>

In addition to products result, the process of casting metals also produces heavy metals such as Cd, Cr, Ni and Pb. This is a risk factor that is harmful to the health of workers because the side effects of heavy metals produced have high toxicity properties<sup>3</sup>. One of the dangers to be considered in connection with the metal foundry industry is the presence of cadmium. Cadmium is one of the heavy metals from the metal melting process, acute cadmium poisoning usually occurs due to cadmium oxide vapor from cutting of cadmium metal or a cadmium-containing metal mixture<sup>4</sup>.

This study aims to analyze relationship between the characteristics of individuals (Smoking Habit and Body Mass Index) and Occupational Factors (Type of Work, Duration of work and working hours) on levels of Cadmium in the blood of metal foundry workers.

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## METHOD

This is Explanatory Research, with cross sectional approach. The sample is the total population of 30 metal foundry workers. Blood sampling assisted by Health Center officer of sub-district Ceper, Klaten, Central

Java. Primary data used in this research is obtained by questionnaire to know variable of individual factor and worker factor. In addition, the primary data were also obtained from the results of laboratory tests for cadmium levels in the blood. This examination was conducted at the Center for Environmental Health Engineering and Disease Control (BBTKLPP) Yogyakarta.

Data analysis used to know the relation of significance between individual factor and worker factor with cadmium level in blood, used Chi Square test.

**RESULTS AND DISCUSSIONS**

**Description of the Research Variable:** Based on the results of research obtained by the distribution of respondents based on smoking habits, most respondents have smoking habit as many as 16 respondents (53.3%). While not smoking as many as 14 respondents (46.7%). Data of respondent distribution based on nutritional status, most of respondent have normal status that is 20 respondents (56,7%), while abnormal nutrition status is 10 respondent (33,3%).

Respondents have a working duration for > 5 years as many as 16 respondents (60%). While the duration of work for <5 years as many as 14 respondents (40%) and respondents who have working hours <8 hours / day as many as 21 respondents (70%). While working hours > 8 hours / day as many as 9 respondents (30%), as well as respondents working on the foundry that is as many as 18 respondents (70%). While in the finishing of 12 respondents (30%), respondents who are not exposed to cadmium are 21 respondents (70%), while cadmium exposure is 9 respondents (30%).

**Table 1: Distribution of Respondent’s Characteristic**

No.	Variable	n = 30	%
1.	<b>Smoking Habit</b>		
	a. Smoking	16	53,3
	b. Non Smoking	14	46,7
2.	<b>BMI</b>		
	a. Normal	20	56,7
	b. Not normal	10	33,3
3.	<b>Working Period</b>		
	a. >5 years	16	53,3
	b. ≤5 years	14	46,7

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4.	<b>Working Hours</b>		
	a. <8 hour/day	21	70
	b. ≤8 hour/day	9	30
5.	<b>Type of Work</b>		
	a. Foundry	18	60
	b. Finishing	12	40
6.	<b>Cadmium in Blood</b>		
	a. Exposed	9	30
	b. Not Exposed	21	70

Metal foundry workers are potentially exposed to Cadmium. In the process of casting the metal, in addition to producing metal products, it also produces heavy metals such as Cd, Cr, Ni and Pb, This is a quite harmful risk to the health of traditional metal foundry workers, considering that the heavy metals have the side effects with high level of toxicity.

It is also worsened by the lack of adequate ventilation, thus it makes the workers to inhale gas from burning result continuously. In doing the job, there is no worker who uses personal protective equipment, even having their meals and drinking is also done in the workplace. Therefore, preventive steps should be prepared much earlier to overcome the possible harmful impact to the workers.

Cadmium can cause interference and even able to cause damage to the kidney system. Such damage may occur in the tubules of the kidneys. The symptom of the damage that can occur in the kidney because of the cadmium is the occurrence of amniouria, glucosuria and the calcium and phosphorus urinary abnormalities<sup>5</sup>

Smoking is one of the main sources of cadmium exposure. Therefore we consider the possibility of smoking as confounding variables in exposure to cadmium in non smokers. The exact mechanism is not yet known whether the smoking causes kidney damage. The mechanism that can be explained is that smoking will make the kidneys more sensitive to cadmium toxicity<sup>6</sup>

**Table 2: Bivariate Analysis between Smoking Habit, BMI, Type of Work, Working Period, Length of Work, Working Hour and Cadmium Level in Blood**

No.	Variable	Cadmium		P	RP	95% CI	
		Exposed	Not Exposed			Lower	Upper
1.	<b>Smoking Habit</b>						
	Smoking	6 (37,5%)	10 (62,5%)	0,440	1,750	0,535	5,729
	Non Smoking	3 (21,4%)	11 (78,6%)				
2.	<b>Body Mass Index</b>						
	Normal	0(0%)	10(100%)	0,013	1,818	1,223	2,703
	Not Normal	9(35%)	11(65%)				
3.	<b>Type of Work</b>						
	Foundry	8(44,4%)	10(55,6%)	0,049	5,333	0,762	37,348
	Finishing	1(8,3%)	11(91,7%)				
4.	<b>Working Period</b>						
	>5 Years	9(56,3%)	7(43,8%)	0,001	0,438	0,251	0,763
	≤5 Years	0(0%)	14(100%)				
5.	<b>Working Hour</b>						
	>8 hour/day	2(22,2%)	7(77,8%)	0,681	0,667	0,170	2,607
	≤8 hour/day	8(28,6%)	15(71,4%)				

The proportion of workers who have smoking habit on cadmium exposure in blood is 37.5% or 6 respondents while non-smokers are exposed to cadmium of 21.4% or 3 respondents. Chi Square statistical analysis results obtained p-value of 0.440 ( $> \alpha = 0.05$ ) showed that there is no relationship between smoking habits against cadmium in the blood of metal foundry workers. The results of this study is similar to the research conducted by Ghazali and Luckett which showed no significant relationship between smoking habit and cadmium content<sup>7,8</sup>

Psychology capacity like smoking habit, alcohol and supplement drink consumption greatly affected the performance and productivity of worker<sup>9</sup> Smokers prone to have respiratory disorder compared to non smokers when they were in hazardous environment. There were 2000 chemicals in the cigarette, and 1200 of them contain toxic substances for human health. Besides that, exposure to cigarette smoke have strong relations with the DNA damage induced by oxidative stress (oxidative stress) and carcinogenesis<sup>10</sup>. Some studies indicate that smoking can caused and increased of cancer in humans, such as lung cancer, mouth, pharynx, laring, esophagus, bladder, stomach, pancreas, kidney, uterus, cervix and myeloid leukemia<sup>11</sup>.

Harmful substances in cigarettes in addition to triggering direct changes to the kidney organs, also

brings the risk of increasing blood and heart pressure. Increased blood pressure is an important factor in the progression of CKG disease. The mechanism of last renal impairment may be seen histopathologically<sup>12</sup>, Smokers are generally exposed to cadmium through inhalation. In a cigarette there is 2 µg of cadmium, where almost 2-10% of it turns into cigarette smoke<sup>13</sup>. Smokers generally have their blood contained with cadmium and the content in the body is twice higher than those who do not smoke<sup>14</sup>. In addition, smokers will also have a high cadmium content in their urine<sup>13</sup>.

Based on bivariate analysis, it is found that the proportion of exposed workers cadmium have normal nutritional status of 45% or 9 respondents. Chi Square statistical analysis result obtained P-Value of 0,013 ( $> \alpha = 0,05$ ) with value of RP: 1,818 and CI 95%; 1,223-2,703 which means that people with normal nutritional status have a risk of exposure to cadmium in the blood of 1.818 times compared to people with abnormal nutritional status.

Human weight reflects the nutritional status of a person. Poor nutrition will affect the decrease of one's body endurance and it brings health problems. People with ideal body weight will have enough nutrients that block the presence of cadmium into the body in replacing nutrients (zinc, iron, copper, selenium,

calcium, pyridoxine, ascorbic acid, and protein). Most cadmium toxicities occur due to the deficiency of the above-mentioned elements causing an increase in cadmium absorption<sup>15</sup>.

Factors of the body such as immunity, the power of respondents in exhaling, the ability of the cilia to filter out the fume dust produced during the casting process, and the pattern of consumption of eating and drinking, is a factor that affects the existence of high cadmium in the body and the existence of zinc (Zn) enzymes such as Glutathione S-transferase<sup>16</sup>.

Entrepreneurs should think about the problems faced by their employees who work over the regulated work hours or carry out the work that is considered heavy, to always provide food security (usually in the form of nutritious food) and extra food (Extra Voeding). Restrictions on working time, the provision of assured regular meal every working day, is an employer's policy to maintain the desired work productivity of the company from its employees.<sup>17</sup>

Based on bivariate analysis, the proportion of workers who are exposed to cadmium working in the foundry section was 44.4% or 8 respondents. The result of Chi Square statistical analysis obtained the P-Value of 0,049 ( $> \alpha = 0,05$ ) showed that there was correlation between work type to cadmium substance in blood of metal foundry workers, with RP value: 5,333 and CI 95%; 0.762 - 37.348 which means that people who work in the foundry have a risk of exposure to cadmium in the blood of 5.333 times than people who work in finishing.

OSHA estimates that 300,000 workers exposed to cadmium in the United States are present in industrial sector workers comprising metal smelting, welding and packaging. This study aims to determine factors that are related to cadmium levels in the blood of metal foundry workers.<sup>4</sup>

Based on the bivariate analysis, it is found that the proportion of workers exposed to cadmium has a work period over 5 years of 56.3% or 9 respondents. Chi-Square statistical analysis results obtained P-Value value 0.001 ( $> \alpha = 0.05$ ) showed that there is a relationship between the length of work against cadmium in the blood of metal foundry workers, with the RP value of: 0.438 and CI 95%; 0.251 - 0.763 which means people who work over 5 years have a risk of exposure to cadmium in the blood of 0.438 times compared to people who work under 5 years.

Respondents who suffered from work-related complaints may be caused by work under long working hours and long period time (more than 3 years) and lack of PPE usage<sup>18</sup>. From research on working adults in USA show that long working hours indirectly precipitate workplace accidents by inducing fatigue or stress in affected workers and overtime schedules had the greatest relative risk of occupational injury or illness, followed by schedules with extended (>12) hours per day and extended (>60)<sup>19</sup>.

Based on bivariate analysis, the proportion of workers exposed to cadmium has working hours over 8 hours / day as many as 22.2% or 2 respondents, while those who have less than 8 hours / day of working hours 33,3% or 7 respondents. Chi Square statistical analysis results obtained P-Value 0.681 ( $> \alpha = 0.05$ ) showed that there is no relationship between working hours of cadmium in the blood of metal casting workers.

This research is similar to the research done by Bagun Sugiharto which explains that there is no relation between work and the number of working hours per week with cadmium level in exhaust welding worker<sup>3</sup>. This inertial study with the study of Ghazali showed no association between length of service and cadmium content, but there was a significant relationship between the working period and the concentration of lead and arsenic metal<sup>7</sup>.

Exposure to the toxic cadmium (Cd) has adverse health effects an occupational or high level environmental exposure<sup>20</sup>. Cadmium exposure is an important risk for renal dysfunction, bone disease and cancer, cadmium is associated with cardiovascular disease too<sup>21</sup>. So all workers who in foundry must use Personal Protective Equipment (PPE) to control hazards at work place.

## CONCLUSIONS

There is a relationship between nutritional status, duration of work, and type of work to cadmium levels in the blood of metal foundry workers. In order to reduce cadmium exposure in the workplace there is a need to be have adequate ventilation in the workplace and the use of personal protective equipment.

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**Conflict of Interest:** The author declare that there is no conflict of interest in this research.

**Ethical Clearance:** Ethical clearance to conduct this study was obtained from Health Research Ethics Committee, Faculty of Public Health Diponegoro University (No.026/EC/FKM/2018)

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# Pharmacovigilance Study of Antituberculosis Drug Regimens in Adult Patients

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## ABSTRACT

The success of pulmonary tuberculosis (TB) treatment in Indonesia was 81,3%. Meanwhile, this number has been not reached the WHO target number of 85%. It was because patients experiencing Adverse Drug Reaction (ADRs) of antituberculosis drugs. Therefore, the government launched a pharmacovigilance program to monitor the ADRs of antituberculosis drugs to improve successful treatment. This study aimed to observe regimens of antituberculosis drug that often caused ADRs and the number event of ADRs. It was non-experimental numerical and analytical descriptive that conducted in outpatient Installation one of Hospital in Klaten, Central Java, Indonesia. Data were collected by interviewing and observing the patients' medical records for two months starting from January to February 2018. The sample was obtained by using purposive sampling method. Then, the data were analyzed by the Liverpool algorithm that interpreted in 4 scales: unlikely, possible, probable, and definite. This study focused on 30 patients, which 23 patients with positive smear and seven patients with negative smear tuberculosis. The result showed that Fix Dose Combination (FDC) of rifampicin, isoniazid, pyrazinamide, ethambutol (RHZE) regimen was the most causing side effects. The number of ADRs were 3-7 in one patient. The most common side effects were reddish urine (90,74%), nausea (90,74%), vomiting (83,33%), shortness of breath (70,37%), and dizziness (22,22%). Almost all antituberculosis drug regimens caused ADRs.

**Keywords:** *Antituberculosis Drugs, Liverpool Algorithm, Pharmacovigilance*

## INTRODUCTION

Tuberculosis (TB) is a chronic granulomatous infectious disease caused by *Mycobacterium tuberculosis* that attacks various organs, especially lungs. Pulmonary tuberculosis remains a significant cause of morbidity and mortality worldwide, uncompleted treatment will lead to severe complications to the risk of death. WHO reported that 8.6 million people of TB in 2014 increase up to 9.6 million people in 2015. Indonesia placet at the second position of high burden country with the percentage

of 10,3%<sup>2</sup>. The success of tuberculosis treatment in Indonesia is 81.3%, it has not reached the target set by WHO (85%)<sup>3</sup>.

ADRs (Adverse Drug Reaction) is regarded as one of the leading cause of non-adherence to antituberculosis treatment (69,01%)<sup>4,5</sup>. As a result, ADRs might eventually contribute to the extension of treatment duration, final termination, drug resistance, and treatment failure<sup>6</sup>. It might also increase the number of TB cases and more rarely the number of deaths, posing a challenge to the management of TB patients and TB control. WHO released a study relating to the detection, assessment, understanding, and prevention of ADRs (pharmacovigilance). It aims to improve patients' care and patients' safety about the use of medicines<sup>7</sup>. In pharmacovigilance, there is active surveillance approach to detect the adverse event. Pharmacovigilance is achieved by active follow up after treatment, and the events may be detected by asking patients directly or

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screening patient record. Liverpool causality assessment tool or Liverpool algorithm is new active surveillance pharmacovigilance method, published in 2011. This algorithm or flowchart is based upon dichotomous questions that were issued from Naranjo algorithm with some alterations. Each answer is routed to more specific question resulting in four causality categories: 'unlikely,' 'possible,' 'probable,' and 'definite'<sup>8</sup>. The assessment obtained by the Liverpool algorithm is closer to the consensual expert judgment (probability of 0.95 and 0.98). That tool concerned only 'probable' and 'certain' categories, both considered in favor of drug causation, sensitivity, specificity, negative and positive predictive values remained identical to those of the Naranjo algorithm<sup>9</sup>. This study aimed to observe regimens of antituberculosis drug that often caused side effects, and the number event of ADRs.

## METHOD

This study was prospective, non-experimental, numerical and analytical descriptive research conducted in one of the government hospitals in Klaten, Jawa Tengah, Indonesia from January – February 2018 licensed by Health Research Ethics Committee Dr. Moewardi General Hospital School of Medicine Sebelas Maret University No. 134/II/HREC/2018. All adult patients of pulmonary tuberculosis (age >18 years old) which outpatient therapy, were smear positive or negative, not pregnant or breastfeeding, and agree to join in this research were included. Independent variable was antituberculosis drug regimens, and the dependent variable was ADRs of antituberculosis.

Materials that used was ADRs parameter, informed consent, interview form based on Liverpool algorithm and patient medical report. Data obtained from interview and observation of patients' medical record included age, gender, co-morbidities, medical history, an antituberculosis regimen that used, ADRs, and the result of patients' laboratory test data. The ADRs event of every regimen in every prescription calculated to total events of ADRs in the regimen. The total cases of all regimens were calculated from total cases of drug regimens used by patients (one regimen was one case). The result of ADRs analysis in each regimen interpreted based on Liverpool algorithm, consisting of 4 scales: 'unlikely,' 'possible,' 'probable,' and 'definite.'

## RESULTS AND DISCUSSIONS

During the two months period, the total of 30 TB patients (23 positive smear pulmonary tuberculosis patients and seven patients with smear-negative pulmonary tuberculosis) were enrolled in this study. Each patient's early diagnosis of pulmonary tuberculosis regimen treatment was observed until February 2018 through the interview and patient medical record. The total of 30 patients showed 54 ADRs (1 patient could get more than one regimen of antituberculosis drugs). This result was suitable to the tuberculosis treatment principle because there was different treatment for intensive and advance phase or drug replacement for patients with severe ADRs.

Characteristics of patient consist of age, gender, and co-morbidities. Table 1 showed the patients' characteristics of pulmonary tuberculosis. Most patients were in the productive age group (15-54 years old) (53,33%). This result was in line with others theory that 75% of pulmonary tuberculosis patients were productive age group<sup>10</sup>. Working class were mainly prone to TB, probably because of exposure outside of their homes as they go outside and from work, etc. It could be a serious adverse effect on the socioeconomic status of a country since the reproductive and economically productive age groups were mostly affected<sup>9</sup>.

As a result, the gender distribution of subjects was male 56.67% and female 31.25%. In another research in Indonesia, the majority of TB patients was male<sup>11</sup>. However, gender was not a significant factor affecting TB<sup>10</sup>. The frequency of tuberculosis and ADRs was significantly higher in patients with smoking and drinking alcohol habit. Cigarettes and alcohol could reduce immunity so that it could be more susceptible to pulmonary TB<sup>12</sup>. Another study concluded that males were more likely to have poor compliance than females so that it could be increasing the risk of TB<sup>13</sup>. Based on co-morbidities, 19 patients (63.33%) were have not co-morbidities, and four others have co-morbidities either one or more. Co-morbidities have a risk of developing tuberculosis; it could decrease antituberculosis respond in the body because of polypharmacy treatment increasing drug interaction<sup>14</sup>.

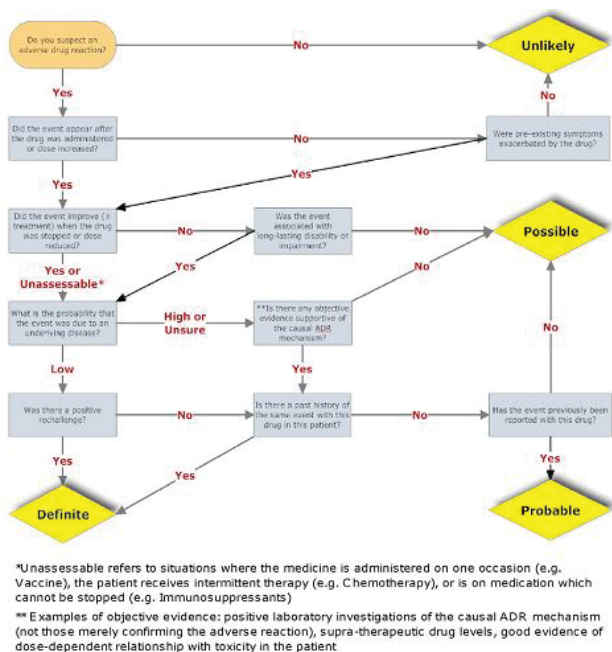


Figure 1: Liverpool Algorithm<sup>8</sup>.

Table 1: Baseline characteristics of the patients smear-positive (n = 23) and smear-negative (n = 7)

Parameters	Variables	Total	
		Smear Positive*	Smear Negative**
Age (years)	<b>Productive (15-54 years)</b>		
	Non productive	14 (60,87%)	2 (28,57%)
	(>54 years)	9 ((39,13%)	5 (71,43%)
Gender	Male	13 (56,52%)	4 (57,14%)
	Female	10 (43,48%)	3 (42,86%)
Co-morbidities	Non co-morbidities	14 (60,87%)	5 (71,43%)
	Pneumonia and anorexia	1 (4,35%)	
	Hepatitis	1 (4,35%)	
	Hypertension	1 (4,35%)	
	Diabetes Mellitus type 2	2 (8,70%)	
	Hypertension and Diabetes Mellitus type 2	1 (4,35%)	
	Typoid and dyspnea	1 (4,35%)	

Conted...

Respiratory Tract Infections	1 (4,35%)	
Gout Arthritis		
Crhonic Heart Failur and Chronic Obstructive Pulmonary Disease		1 (14,29%)

Note:

\*Smear-positive patients showed positive Mtb In their sputum.

\*\*Smear-negative patients showed positive Tb in their thorax test.

**Antituberculosis Regimens:** Antituberculosis regimens which used by patients were Fix Dose Combination (FDC) and single dose with duration treatment between 6-9 month. There were eight regimens used by patients showed in table 2. Regimens for the therapy consist of rifampin (R), isoniazid (H), pyrazinamide (Z), ethambutol (E), and streptomycin (S). Patients use not only antituberculosis drug but also use other medications like vitamins, antihistamines, analgetics antipyretics, anticonvulsant, appetite enhancing drugs, proton pump inhibitor, antiasthma, antiemetics, antigout, antihypertension, antidiabetics, antibiotics, corticosteroids, and antianginal based on their co-diagnosis, complaints, ADRs cause antituberculosis drugs and drugs to prevent ADRs.

Table 2: Antituberculosis regimen for smear positive and negative patients (Σ total cases = 54)

Regimen	Dose (mg)	Total Cases of Treatment (n)	
		Smear Positive	Smear Negative
R1	450/300/1000/750	21	7
R2	450/300	5	1
R3	450/300/250	1	0
R4	300/750/750	3	0
R5	450/300/1000/750/750	6	1
R6	450/300/750	7	0



R7	450/300/250	1	0
R8	450/300/1000/750/ 750 +150	1	0
Total		45	9

**Note:** (R1) FDC (RHZE), (R2) FDC (RH), (R3) (RHE), (R4) (HE)+S, (R5) (RHZE)S, (R6) (RH)S, (R7)(RHE)S,

**Pharmacovigilance:** Pharmacovigilance method in this study was active surveillance<sup>3</sup> using algorithm Liverpool as instrument causality assessment tool to detect ADRs. Antituberculosis regimens which used by patients have various ADRs and more than one events of ADRs. Every regimen calculated with algorithm Liverpool and interpreted with four scales: ‘unlikely,’ ‘possible,’ ‘probable,’ and ‘definite.’ Table 3 showed the interpretation result of algorithm Liverpool of each regimen. This study was already tested with application drug interaction checker (www.drugs.com) to ensure that the incidence in patients was a side effect not causes others

factor. The result of drugs interaction test concluded that there was no drug interaction in each case.

As a result, regimens that caused ADRs were R1, R2, R3, R4, R5, and R6. R7 and R8 that not reported have adverse effects of drug because it was not recorded on a patient’s medical record and based on an interview with patients using this regimen. They explained that they fell familiar with the adverse effect of previous regimens, so they did not feel disturbed by the side effect of two regimens.

Table 4 showed a regimen that is often causing ADRs was R1 with a 3-7 range of events ADRs, each patient. R1 was the highest regimen that producing ADRs compared to others. It was the first line therapy for patients of pulmonary TB, so most patients use this regimen. The more patients use, the more ADRs. It was due to differences of psychology every patient, so antituberculosis drug would cause different ADRs in each patient.

**Table 3: Interpretation of algorithm Liverpool (Σ = 54)**

Regimen	Total Cases (Σ)	Scales (n)			
		Unlikely	Possible	Probably	Definite
R1a	21	0	15	3	3
R1b	7	0	6	1	0
R2a	5	0	5	0	0
R2b	1	0	1	0	0
R3a	1	0	1	0	0
R4a	3	0	2	0	1
R5a	6	0	6	0	0
R5b	1	0	1	0	0
R6a	7	0	7	0	0

**Note:** a showed smear-positive patients, and b showed smear-negative patients.

**Table 4: ADRs events based on an antituberculosis regimen (Σ = 54)**

Regimen	Σ**	n*	Range of Event
R1	28	147	3-7
R2	6	22	3-5
R3	1	4	4
R4	3	10	3-4
R5	7	30	3-6
R6	7	25	2-4

Note: \*n = Total of ADR event per Regimen

\*\*Σ= Total of ADR event

Table 5 shows the number of ADRs percentage from each regimen. Common ADRs resulted from this study were redness urine (90.74%), nausea (90.74%), vomiting (83.33%), breathless (70.37%), and dizziness (22.22%). The most common ADRs occurrence was reddish urine, it caused by the use of rifampin<sup>15</sup>. This ADRs almost felt by all patients after taking rifampin, but they were not worried or scared because doctors and nurses already gave them an explanation about ADRs. Then, gastrointestinal reactions caused by rifampin and pyrazinamide. These ADRs were not frequent, it starts shortly (2-3 hour) after administration of the drug<sup>16,17</sup>. Generally, the reaction

in this study was nausea (90.74%), vomiting (83.33%), and abdominal pain (1.85%). According to an interview with patients, they explained that they experienced gastrointestinal symptoms just on the first month after administrated the drug. The administration of drug could avoid gastrointestinal symptoms during or immediately after meals<sup>15</sup>.

The other ADRs was breathless (70.37%). The reaction suspected because of administration of rifampin. It generally appeared between 3-6 months after the beginning of rifampin treatment, the symptoms appear 1-2 hour after the drug administration with a dose of 10 mg/kgBB<sup>16</sup>. The influenza-like syndrome was almost exclusively caused by rifampin. This pseudo influenza syndrome in this study includes dizziness (22.22%), faintness (9.26%), cough (3.7%), fever (3.70%), pain (9.26%), shivering (1.85%), appetite down (1.85%), and itchy throat (1.85%). These ADRs rare occurred in patients. The symptoms appear a similar 1-2 hour after 10 mg/kgBB administration of rifampin<sup>16</sup>. Then, other ADRs were skin rash (9.26%) and skin redness (1.85%). The reaction was on grade 1 (Macules/papules covering <10% body surface area with or without symptoms). It generally appeared 1-2 hour after administration dose 600 mg of the drug. That ADRs maybe occurred because of administration of rifampin<sup>16</sup>. In contrast, the dose used in this study was less than 450 mg, perhaps it affected the response, or clinical conditions of each patient vary.

Pyrazinamide caused ADRs gout arthritis, like a swollen foot (5,56%) and aches (3.70%). The reaction was on grade 2 (number of uric acids > 10 mg/dL with the psychological disorder). It generally appeared after

administration daily dose 300 mg<sup>18</sup>. Then, another ADRs was blurred vision (3.70%) on R1 and R6. It suspected after administration ethambutol. This ADRs generally appeared after administration daily dose 25-35 mg/kgBB (3-5 month after start administration of the drug)<sup>19</sup>. This ADRs was reversible. Also, patients also complained of this ADRs 3 month after administration ethambutol. The grade of this ADRs was grade 1 (asymptomatic, only need clinical observation or diagnostic).

The ADRs subsequent was hepatic disorders (3.20%) in R1 characterized by high bilirubin (1.10 mg/dL) from normal conditions (0-0.3 mg/dL). R4 characterized by high direct bilirubin (0.96 mg/dL), ALT 105.4 mg/dL and AST 308.1 mg/dL. Bilirubin was the normal by-product of the breakdown of hemoglobin. SGOT test was a more sensitive indicator of liver damage than serum glutamate pyruvate transaminase (SGPT). The GOT enzyme was primarily in the liver, whereas the GPT enzyme was found in other tissues, especially the heart, skeletal muscle, kidneys, and brain. SGOT or AST and SGPT or ALT show the integration of hepatic cell. Increasing hepatic enzyme showed the extent of hepatic cell damage<sup>22</sup>. This reaction suspected by isoniazid (1000 mg) with the duration of 21 days<sup>20</sup> or may due rifampin at a daily dose (600-900 mg). ADRs of rifampin appeared 1-6 weeks after administration of the drugs<sup>17</sup>. Hepatic disorders also caused by pyrazinamide (40-50 mg/kgBB)<sup>21</sup>. Other ADRs such as trembling (12.96%), cold sweat (5.56%), and insomnia (3.70%) could not be ascertained; it because in the list of antituberculosis ADRs from Indonesian Health Ministry was not reported the ADRs. It was possible that the ADRs rare occurred in tuberculosis patients.

**Table 5: Percentage of ADRs event on smear positive and negative patients ( $\Sigma$  total cases = 54)**

No.	ADRs	Total ADRs Each Regimen(n)								Total Cases (N)	Percentage* (N/ $\Sigma$ )x100%
		R1	R2	R3	R4	R5	R6	R7	R8		
1.	Redness urine	28	6	1	-	7	7	-	-	49	90,74%
2.	Nausea	27	6	1	3	6	6	-	-	49	90,74 %
3.	Vomiting	25	5	1	3	6	5	-	-	45	83,33%
4.	Breathless	23	2	1	2	5	5	-	-	38	70,37%
5.	Dizziness	9	-	-	1	2	-	-	-	12	22,22%
6.	Trembling	6	1	-	-	-	-	-	-	7	12,96%
7.	Skin rash	4	-	-	-	1	-	-	-	5	9,26%
8.	Faintness	5	-	-	-	-	-	-	-	5	9,26%
9.	Pain	3	1	-	-	-	1	-	-	5	9,26%
10.	Swollen foot	3	-	-	-	-	-	-	-	3	5,56%

Conted...

11.	Cold sweat	2	-	-	-	1	-	-	-	3	5,56%
12.	Insomnia	2	-	-	-	-	-	-	-	2	3,70%
13.	Hepatic disorder	1	-	-	1	-	-	-	-	2	3,70%
14.	Cough	2	-	-	-	-	-	-	-	2	3,70%
15.	Blurred vision	1	-	-	-	-	1	-	-	2	3,70%
16.	Aches	1	1	-	-	-	-	-	-	2	3,70%
17.	Skin redness	1	-	-	-	-	-	-	-	1	1,85%
18.	Itchy throat	1	-	-	-	-	-	-	-	1	1,85%
19.	Abdominal pain	-	-	-	-	1	-	-	-	1	1,85%
20.	Appetite down	1	-	-	-	-	-	-	-	1	1,85%
21.	Fever	1	-	-	-	1	-	-	-	2	3,70%
22.	Shivering	1	-	-	-	-	-	-	-	1	1,85%

**Note:** n = Total ADRs Each Regimen, N = Total Cases, \*percentage(%) = (N)/(Σ) x 100%, \*\*Σ= Total of ADRs event

### CONCLUSIONS

This study showed that antituberculosis regimen which used by patients were FDC RHZE, FDC RH, RHE, (HE)+S, (RHZE)S, (RH)+S, RHE+S, and (RHZE) S+R. The most antituberculosis regimen used was FDC RHZE with range 3-7 ADRs events every patient. Six from eight antituberculosis regimens were FDC RHZE, FDC RH, RHE, (HE)+S, (RHZE)S, (RH)+S caused ADRs like redness urine (90.74%), nausea (90.74%), vomiting (83.33%), breathless (70.37%), and dizziness (22.22%).

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**Ethical Clearance:** This study was approved by the Health Research Ethics Committee Dr. Moewardi General Hospital School of Medicine Sebelas Maret University No. 134/II/HREC/2018.

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# Noise Exposure Assessment and Estimated Excess Risk of Cabin Personnel in the Locomotive-CC205

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## ABSTRACT

Train is one of the most environmentally friendly mode of transportation. However, currently there are still some types of locomotive designed to be opened (such as CC201); hence, the generated noise can potentially affect the health of the workers, particularly cabin personnel (i.e. train driver and assistant of driver). The objective of this study are to analyze the noise levels exposed to cabin personnel and to estimate the excess risks of occupational noise-induced hearing loss in the locomotive. The cabin personnel were considered as exposed group while the office workers of the train station (Poncol Station) was the control group. The noise levels were measured continuously during the working hours using noise dosimeter. The audiometry test was also conducted to both case and control group. The data were analyzed using chi-square statistical test and NIOSH 1998 method of excess risk estimation. The measured noise exposure level in the locomotive-CC205 during the working hours (4-5 hours) ranged from 71.2 dBA until 123.4 dBA. However, the excess risks of the respondents were only 0.75% higher than the control group. This might be due to the short working period of the participants (no more than 10 years). The noise exposure to the case group workers were higher than time-weighted average noise level. Based on the chi-square statistical test, it is concluded that the noise levels affect the noise-induced hearing loss of the cabin personnel.

**Keywords:** train, noise, noise-induced hearing loss, excess risk

## INTRODUCTION

Competition in the era of globalization requires that every activity must pay attention to environmental aspects. This global orientation of global development demands the initiators and managers of the industry, both the manufacturing industry and the service industry to change the mindset and aspiration of its business activities toward modern, environmentally sound business concerning safety and health, including railway companies. The railways not only have a positive impact on the workers, but also the potential negative impacts such as health impacts due to noise and vibration. This situation will potentially affect the health of workers working around the railway or working in the station.

Area Operation IV Semarang or abbreviated as DAOP IV Semarang and DAOP IV SM or D4 SM Release Tobu Hope is one of the Indonesian railway operations area, under PT Kereta Api Indonesia (Persero), or PT KAI, led by an Executive Vice President (EVP). The highest noise intensity is felt by train drivers because the cabin position is at a very close distance to the rail diesel engine.

Harrington<sup>1</sup> argued that noise can affect health such as hearing function, changes in the frequency of heartbeat, changes in blood pressure, and the level of sweat excretion. In addition, noise can also be associated with the occurrence of hypertension<sup>2-4</sup>. People who are exposed to noise, tend to have unstable emotions then emotional instability will lead to stress<sup>2</sup>. Yoon et al<sup>5</sup> also proved that noise in the work environment was closely related to mental health conditions. Long-term stress will cause the narrowing of blood vessels, so the heart must work harder pumping blood throughout the body. In a long time, blood pressure will rise, and this is called hypertension. Furthermore, it is found that there is significant associations between noise exposure, noise-induced hearing loss, and work-related accidents<sup>6</sup>.

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In this study the selected location is a cabin of train driver with the object of cabin personnel. The selected route was from Semarang to Tegal as a short-haul train at DAOP IV Semarang Poncol. The route of Semarang-Tegal was chosen because it was the longest path that can be reached from Semarang Station in one day. The objectives of this study are to analyze the noise levels exposed to cabin personnel and to estimate the excess risks of occupational noise-induced hearing loss in the locomotive.

## METHOD

This research was an analytic research comparing between case group and control group based on noise exposure. The history of exposure in this study can be known from the medical register or based on interviews of the study respondents. The sampling technique of respondents was done by using purposive sampling method with the object of cabin personnel in DAOP IV PT KAI short-distance route.

## DATA COLLECTION

**Noise Level Measurement:** The noise level data collection was done by direct measurement. Noise level measurement was conducted in the railway locomotive cabin of CC205 from Semarang to Tegal by placing the Noise Dosimeter on the cabin personnel. The reading was done every five seconds during the roundtrip. This reading was in accordance with Decree of Ministry of Environment No. 48/1996 on Noise Level Thresholds. Noise Dosimeter used in this study was Lutron DS-2013SD, that is capable of recording noise data. The noise data were recorded in the form of a diagram for easy reading. Measurement of noise data started from the initial departure station (the Semarang Poncol Station) until Tegal Station.

**Audiometry test:** Cabin personnel perform audiometric tests to determine the degree of deafness of cabin personnel as case group. The results were recorded in an audiogram, where the horizontal line represents the frequencies and vertical lines describing the intensity. This was also applied to officers at the Poncol Station as a control. The audiometric test organizing was assisted by audiologist and certified specialist technician. Cabin personnel were also asked to fill in some questions from questionnaires in the form of a complete list of questions about identity, health status, working period, working duration, residence history, and others with a definition

of each question to facilitate the respondents to fill in the questionnaire.

Determination of respondents in the population used purposive sampling method with inclusion and exclusion criteria. Exclusion criteria are the characteristics of respondents who can not be included in the research, as for exclusion criteria, such as respondent refused to participate, respondent was sick or did not come during the study. Meanwhile, inclusion criteria are the characteristics of respondents who can be included or eligible for study, as for inclusion criteria, including:

1. **Age<sup>7</sup>:** Controlled by selecting workers aged 18-50 years. The older the working age the more vulnerable to exposure to work environment and occupational diseases.
2. **Working period<sup>7</sup>:** Controlled by selecting workers whose working period is >3 years due to the fragile working period of occupational diseases between 2-6 years.
3. **Health condition:** Controlled by selecting workers who have healthy status and no history of hearing diseases

Cabin personnel performed audiometric tests to determine the degree of perceived hearing threshold. Officer of the station who became the respondent was the officer with morning shift until the afternoon. Cabin personnel respondents were cabin personnel on duty as backup engineers. Questionnaire survey and audiometric inspection were done at the origin station (Semarang Poncol) for the station personnel whereas the office staff of UPT Crew Semarang for cabin personnel. The recording of the audiometry test results were carried out at frequencies from 500 Hz to 6000 Hz and taken average values to 500 Hz, 1000 Hz, 2000 Hz, and 4000 Hz each right ear and left ear. A reference value determined whether the respondent had normal hearing, light deafness, moderate hearing, or severe deafness according to the classification of hearing impairment degree.

## DATA ANALYSES

**Noise Level Assessment:** The noise level metric used was Leq (equivalent continuous noise level) in dBA and LN (statistic noise level) such as L5, L10, L50, L90. By definition, the L10 value is the noise level achieved for 10% of the measurement time and describes the peak

noise. The L50 value is the noise level achieved for 50% of the measurement time and describes the median (middle value) of the noise level. And the L90 is a noise level achieved for 90% of the measurement time, describing residual noise.

**Relation between Noise exposure and Hearing Loss:** In this case, the independent variable was noise and the dependent variable was hearing loss. Meanwhile Chi Square test was used to analyze the relationship between noise level and the status of hearing loss of cabin personnel. Chi-Square test is a statistical technique used to test the hypothesis when the population consists of two or more classes in the form of categorical data.

The significant level used is 95% with a significance value of 5%. Criteria value (p-value) generated was compared to the value of significance selected with the following criteria:

If Sig. >  $\alpha$ ,  $H_0$  is accepted

If Sig. <  $\alpha$ ,  $H_0$  is not acceptable yet

Or in sentence form is as follows:

$H_0$ : There is no relationship between the noise level and the hearing impairment of cabin personnel

$H_1$ : There is a relationship between the noise level and the hearing loss of cabin personnel

**Estimation of Excess Risks:** Attributable risk is another term from Risk Difference, Excess Risk, and also Rate Difference. Attributable risk is the level of disease in population who are exposed, reduced by people who are not exposed. In the current study, the respondents were those exposed to noise (cabin personnel) and those not exposed to noise (station officers). Excess Risk is the most relevant association measure when making decisions for individuals. For example, in determining whether workers who are working in the high noise section, analysis is carried out to determine the amount of risk of injury that must be borne by the worker 's participation in carrying out a job. The risk of developing a disease that can be caused by specific exposure, or how the disease occurred due to exposure to certain factors. Estimation of excess risk of hearing loss was calculated from the measured audiometric test data. The calculation was based on 1998 National Institute of Occupational Safety and Health model (NIOSH 1998)<sup>8</sup> because NIOSH is the most commonly used reference in Indonesia. These models determine the average hearing loss for the Frequency range (0.5-4.0 kHz) representing 0% and hearing 100% disability limit respectively. The lowest limit of 25 dBA is

normal hearing. The calculation used an online calculator developed by Kavanagh<sup>9,10</sup> and can be accessed at <http://www.occupationalhearingloss.com>.

## RESULTS AND DISCUSSION

**Locomotive-CC201 Specification (Semarang-Tegal Route):** Kaligung Railway (KA Kaligung) or Locomotive CC201 is one of the trains owned by PT KAI serving Semarang-Tegal and Tegal-Semarang route as far as 148.1 km. There are 50 bridges traversed by KA Kaligung along the journey from Semarang Poncol Station to Tegal Station. Settlements traversed by KA Kaligung is a settlement located close to the area of the station, as well as settlements located in urban areas. The train passes several stations, namely Semarang Poncol Station, Weleri Station, Pekalongan Station, Pemalang Station, and finally at Tegal Station.

Kaligung Train is one type of economic train that has air conditioner and two-seat for more comfort to passengers. Beginning February 1, 2012 PT KAI DAOP 4 Semarang adds KA Kaligung has two roundtrips Tegal-Semarang and is usually pulled by Locomotive CC201. KA Kaligung's locomotive numbered CC201 means that it is using two bogies with each three driving wheels and using electrically series diesel locomotive type 01. The average travel time from Semarang to Tegal is for 2.5 hours.

**Noise Level Assessment:** The statistical results of the cabin noise level rating of KA Kaligung are shown on the graph in Figure 1.

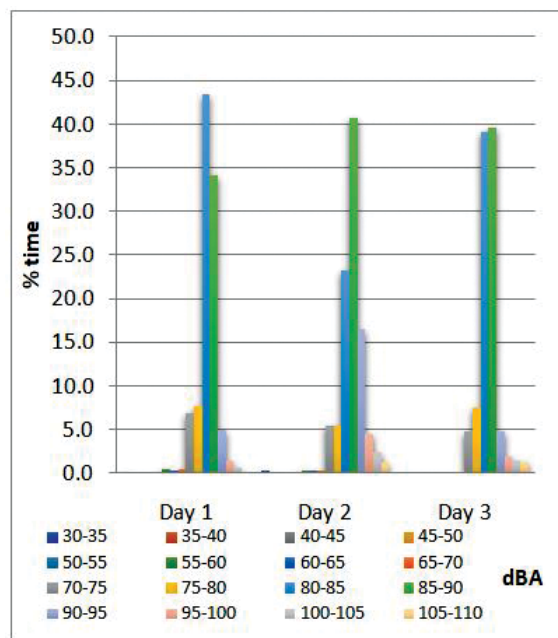


Figure 1: Statistics of Noise Level in the Cabin of Locomotive-CC201

On the first day (Friday), 43.9%, 1.4%, 34.5%, and 6.9% of travel time along the engineering department accounted for 80-85 dBA, 95-100 dBA, 85-90 dBA, and 70-75 dBA, respectively. If it is compared to second day (Saturday) and third day (Sunday), there was noise level ranged from 105-110 dBA accounted for 1.2% of travel time. It can be inferred that during weekend, the noise level became higher than weekday (Friday). Because noise levels often fluctuate over a wide range and over time, single-value descriptors like Leq become important. The statistic results of the measurement of the noise level in the driver cabin is described in Figure 2. The Leq in the locomotive cabin was ranged from 87.5 to 93 dBA, while L10 was more than 90 dBA. According to the field observation, the noise source were not only came from the engine, but also the horn, rolling noise, aerodynamic noise, background noise, and other noise source. According to Platon and Tudor<sup>9</sup>, the noise exposure from diesel engine and the locomotive air compressor is a risk factor for the driver in the first place because it can affect concentration and decision of the driver.

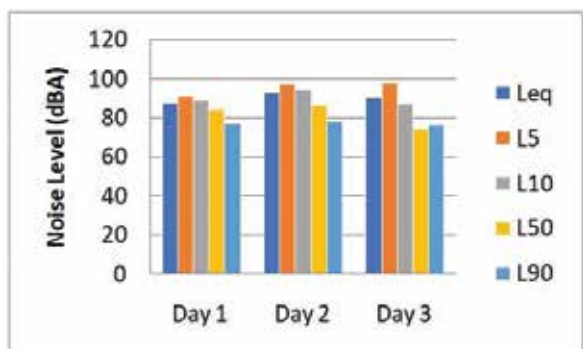


Figure 2: Summary of Noise Level Data Measurement in the Cabin of Locomotive-CC201

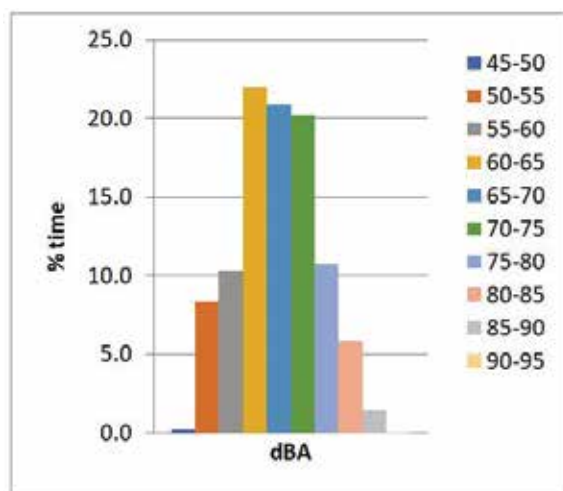


Figure 3: Noise Level Data Measurement in Semarang Poncol Station

Meanwhile, in the Semarang Poncol Station, the measured noise level (Leq) was 74.78 dBA, L10 was 78.5 dBA, L50 was 67.2 dBA and L90 was 56.1 dBA. It can be inferred that noise at the station was less than the threshold limit for 8 working hours and was relatively lower than the noise in the locomotive or driver cabin. Therefore, the officers in Poncol Station can be considered as control group of this study.

**Relation between Noise Exposure and Hearing Loss:** Chi Square Analysis of Noise and Hearing Loss Relationships. Using the following hypothesis:

$H_0$ : Noise level has no effect on hearing loss

$H_1$ : Noise level affects hearing loss

At the level of significance  $\alpha = 0.05$  if the value of  $\text{Sig.} < \alpha$ ,  $H_0$  is rejected, meaning that there is noise level effect on hearing loss. Based on the Chi-Square Tests table, it is obtained that Chi-square ( $X^2$ ) = 7.680 and  $\text{Sig.} = .006$  then  $H_0$  is rejected so that in concluded at the level of significance 0.05 or 5%, there is noise level effect on hearing loss. According to the noise measurement in Semarang Poncol Station (inside the office), the noise level exposure was below 85 dBA (75 dBA). Meanwhile, in the cabin of locomotive CC-201 namely 87.5 – 93 dBA.

**Estimation of Excess Risks:** Based on the calculation, the average value of the highest estimated excess risk hearing loss is 0.75% for cabin personnel and 0% for station officers, with the equation of the 1998 NIOSH model. This model calculates the average excess hearing risk decrease in audiometric test frequency of 1, 2, 3 and 4 kHz. This finding was validated by the fact that the threshold test for both ears was the highest on the 4 kHz frequency for 60 cabin personnel. Detailed audiometric analysis based on the type of work also showed that more than 90% of station staff had no excess risk of hearing loss, while more than 30% of cabin personnel had excess risk of hearing loss. It can be concluded that the average excess risk estimation of cabin personnel hearing loss is higher than that of the control group (station officer) due to the influence of work hazard (noise) exposed to cabin personnel.

The meaning of the average value of 0.75% is that that people who exposed to noise (cabin personnel) are 0.75% more at risk of hearing loss, while 0% is estimated to be at risk of hearing loss to the station officers. In other words, cabin personnel are at risk of



hearing loss if they continue to be in a state of the same noise exposure, while station officers are not at risk. This is due to the considerable noise level difference between the locomotive cabin that exceeds the threshold ( $\pm 90$  dB) felt by cabin personnel, and the station noise level is still below the threshold (75 dB). However, the risk of 0.75% might be considered as underestimation because the working period of cabin personnel was relatively low (no more than 10 years).

Presbycusis is sensorineural hearing loss or hearing loss naturally caused by aging<sup>8</sup>. In audiometry, presbycusis has no effect on the frequency of 4000 Hz but higher frequency. From audiometric test data it is known that there is a relationship between decreased hearing ability and age. For example, a 46-year-old respondent with 4.06% hearing ability and 27.24% presbycusis. This means that there is a high potential that the respondent is affected by decreased hearing ability due to aging.

Excess risk estimation of hearing loss in cabin personnel causes consideration of risk management actions. Risks that occur within PT KAI are an integral part of the organizational process, risk control is an integral part of management's responsibilities, in ensuring the achievement of organizational goals. Therefore, risk control can improve the effectiveness and efficiency of management, because all the risks that can disturb the organizational process have been well identified, then the way to overcome the disruption of organizational processes has been anticipated in advance, so that if the disturbance does occur then the organization is ready to handle it properly. A proper measure to control occupational noise has been conducted in Norwegian railway company that the risk of noise-induced hearing loss of the workers during period 1991-2014 has been negligible<sup>11</sup>. This can be adapted to Indonesian Railway Company (PT KAI) if there is further countermeasure to noise exposure toward railway workers. For optimizing the investment, a thorough life-cycle assessment can be conducted because the impacts and values of noise mitigations can vary from urban area to rural area network<sup>12</sup>.

## CONCLUSIONS

The noise sources on the Kaligung Locomotive CC201 which can affect the hearing of cabin personnel are the horns (110-123.4 dBA), the sound of the rail engines (86.4-99.6 dBA), and during braking (71.2

dBA). Based on analysis of Chi Square Test, the risk factors that can cause hearing impairment in DAOP IV Semarang (KA Kaligung Locomotive CC201) was the noise level, Estimation of excess risk of hearing loss in cabin personnel in DAOP IV Semarang by 0.75% that is higher than control group (0%).

**Conflict of Interest:** Nil

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**Ethical Clearance:** This study did not take ethical clearance since it is not a biomedical research.

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# Forgiveness Meditation as an Effort in Improving Mental Health among College Students

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## ABSTRACT

College students as emerging adulthood may experience both mental and physical health problems due to maladaptive adjustments. Both mental and physical health problems are mutually reinforcing that cause marked impairment in everyday life functioning. Efforts to deal with mental health problem are expected to promote general health. Either forgiveness or meditation is separately proven effective in improving mental and physical health, but the efficacy of forgiveness meditation has not been adequately researched. This study aims to examine the effect of forgiveness meditation toward mental health improvement among college students, as indicated by the declined of distress. This study used one-group pretest-and-posttest quasi-experimental design with follow-up measurements two weeks after treatment ended. Measurements were conducted using the short version of General Health Questionnaire (GHQ-12). Samples were obtained using purposive sampling techniques, as many as 9 college students from The Faculty of Public Health, Diponegoro University, Semarang, Indonesia. The analysis using statistical test of Wilcoxon T-test between pre-test and post-test, and pre-test and follow-up, showed significant decrease (respectively were  $Z=-2.670$ ,  $p=.008$ ;  $Z=-2.675$ ,  $p=.007$ ), while between post-test and follow-up did not ( $Z=-.256$ ,  $p=.798$ ). The result showed a significant decrease in distress after treatment ended. This result remained significant up to follow-up measurements, though the difference between post-test and follow-up was not significant. Forgiveness meditation may have sustainable and increasing effect if it is regularly practiced. A sustained decrease in distress, which indicates the improvement of mental health, is further expected to support the improvement of physical health, adaptive adjustment, and optimal functioning.

**Keywords:** *emerging adulthood, distress, mental health, forgiveness meditation*

## INTRODUCTION

College students as emerging adult (approximately 18 to 25 years of age) are characterized by experimentation and exploration<sup>1</sup>. While there is a development in cognitive abilities and awareness<sup>2</sup> that strengthens career path, identity formation, and lifestyle choices to be adopted, emerging adult remains at risk for psychological problems. Greater risk occurs in adolescents who experience accumulated adverse life

experience and psychological distress, due to differences in cognitive appraisal and emotion regulation<sup>3</sup>. The presence of diverse capabilities to modulate emotions<sup>4,5</sup> makes the adjustment during transition to adulthood even more difficult and potentially problematic<sup>2</sup>. As the result, they may become prone to both mental and physical problems.

Rumination and poor emotion regulation can lead to low distress tolerance, thus making psychological distress implicate in the emergence of psychopathology among college students. The preliminary research result showed that 45.7% of 495 undergraduate students in Diponegoro University, Semarang, Indonesia were at risk of having psychological distress<sup>6</sup>. Among university students, psychological distress has a direct effect on the emergence of depressive symptoms<sup>7</sup>. Low distress tolerance further mediates between depression and trauma, and the emergence of alcohol drinking problems in young adult<sup>8</sup>.

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A study that reviewed epidemiological papers for 15 years on psychiatric disorders showed a trend in psychopathology across the adolescent years to adulthood<sup>9</sup>. It mentioned that about one in five adolescent had a psychiatric disorder. There was an increase in rates of depression, panic disorder, agoraphobia, and substance use disorder from childhood to adolescence. While from adolescence to early adulthood there was a further increase in panic disorder, agoraphobia, substance use disorder.

Psychopathology may also be developed through the adoption process as a result of psychological distress against non-normative life events. The findings of several studies on left-behind children, for example, showed that the adolescents had higher scores in anxiety<sup>10</sup>, loneliness<sup>11</sup>, fear, and self-blame<sup>12</sup>. In addition to psychiatric disorders such as hyperactivity and conduct problems<sup>13</sup>, depression characterized by low self-esteem and increased risk for suicidal behaviors<sup>14</sup>, psychological distress in these adolescents were often leads to the adoption of maladaptive behavior, such as substance use disorder and internet addiction<sup>15</sup> or engaging in illegal and criminal activity<sup>16</sup>.

Besides mental and behavioral problems, the psychological distress negatively impacts sleep<sup>17</sup> and increases health risk behavior, ie through higher levels of physical inactivity and skipping breakfast<sup>15</sup>. A similar study indicates the impact of psychological distress on nutrition indicators (ie of fruit, vegetable, and takeaway food consumption), thus implicating health status<sup>18</sup>. Finally, psychological distress further increases the risk of occurrence of chronic diseases such as cardiovascular disease which is largely explained by behavioral processes, ie through the occurrence of health risk behavior<sup>19</sup>.

Mental health problem that develops as a result of maladaptive adjustment when encountering psychological distress is also followed by change in health status. Both mental and physical health issues are mutually reinforcing, causing marked impairment in everyday life functioning. As in the case of major depressive disorders who were often reported to have functional deficits in domains of employment status, occupational productivity, interpersonal relationships, autonomy, and global functioning<sup>20,21,22</sup>. Therefore efforts to improve the ability to deal with psychological distress are expected to promote general health.

Forgiveness meditation is one of the many psychological interventions developed to forgive through meditation, which emphasizes the intrapersonal process. Meditation is one of the professional deep relaxation which involves easily sustaining focus on a very simple stimulus<sup>23</sup>. Meditation cultivates focused attention and moment-to-moment awareness of one's experience in order to heighten the capacity to bring conscious choice to responses and reactions<sup>24</sup>. While forgiveness is freeing from a negative attachment to the source that has transgressed against a person<sup>25</sup>. In an interpersonal context, it is defined as "a willingness to abandon one's right to resentment, negative judgment, and indifferent behavior toward one who unjustly hurt us, while fostering the undeserved qualities of compassion, generosity, and even love toward him or her"<sup>26</sup>.

Meditation alone has been tested to reduce psychological distress<sup>27</sup> and perceived stress, as well as improve forgiveness<sup>28</sup>. On the other hand, people who have higher levels of forgiveness are reported to have lower levels of anger and psychological distress, where the state anger largely mediates the association between forgiveness and psychological distress<sup>29</sup>. Forgiveness itself is meant not only for others in the context of interpersonal transgression, but also for oneself as well as situations<sup>25</sup>.

Forgiveness meditation has been developed<sup>30,31</sup> but research on the efficacy of this intervention is still limited. Similar research interventions are loving-kindness meditation and compassion meditation, ie exercises oriented toward enhancing unconditional, positive emotional states of kindness, and compassion<sup>32</sup>. The literature suggests that these two interventions are associated with various benefits, including those improving positive affect, reducing distress and negative affect such as anxiety and mood symptoms, and being useful for treating interpersonal problems.

Research on forgiveness meditation is expected to support the efficacy of this intervention, in this case, to alleviate the psychological distress, thereby reducing the risk of physical problems and further mental and behavior problems. The present study aimed to examine the effect of forgiveness meditation toward mental health improvement among college students, which was an emerging adult, as indicated by the declined of psychological distress. Specifically, it was hypothesized that there was a significant decrease in psychological distress in the group receiving forgiveness meditation intervention.

**METHOD**

This study used one-group pretest and posttest quasi-experimental design. Follow-up measurement were also conducted to see the effect of intervention up to two weeks after the end of treatment.

The selection of participants in this study was conducted using purposive sampling technique by considering some characteristics and initial measurement results. Participants in this study were 9 undergraduate students of The Faculty of Public Health, Diponegoro University in Indonesia. The inclusion criteria, namely (1) emerging adult (18-25 years), (2) experiencing psychological distress based on the measurement results (cut-off score 10/11), (3) had never been involved in psychological therapy and drug therapy for treatment of psychological problems, and (4) willing to engage in interventions completely and voluntarily, as indicated by the signing of informed consent.

Measurements of psychological distress were performed using the short version of General Health

Questionnaire (GHQ-12). GHQ-12 is a 12-item self-report which measures of psychological morbidity, both in community settings and non-psychiatric settings to detect psychiatric disorders<sup>33</sup>. Not only was it widely used to perform unidimensional measurements, the GHQ-12 instead assesses psychological morbidity in two (positive and negative items) or three dimensions (“social dysfunction”, “anxiety and depression”, and “loss of confidence”)<sup>34</sup>. Respondents had to choose one of the four offered scales, that is 1) less than usual, 2) no more than usual, 3) rather more than usual, 4) much more than usual how frequently they experienced recently the different symptoms listed on the scale. Cronbach  $\alpha$  in this study = .841.

The data were processed quantitatively by descriptive, and inferential statistical methods using the Wilcoxon t-test by means of the Statistical Package for the Social Sciences (SPSS) Windows Version 22. The tests were performed to see differences in measurements on pretest and posttest, pretest and follow-up, as well as posttest and follow-up, within group with limited subjects.

**Table 1: Forgiveness meditation intervention procedures**

Day (Total Duration in minutes)	Topic (Duration in Minutes)	General Objective	Activity	Methods
1 (150 minutes)	Opening (30 minutes)	Opening an intervention with a set of administrative procedures	Opening and introduction (research teams and participants)	Lecture, Q & A
			Explanations of the research and intervention, contracts, and informed consent	
	Facilitating negative emotions (45 minutes)	Increasing awareness of the importance of forgiveness meditation	Explanations of forgiveness meditation backgrounds: negative emotions and their impact on life	Lecture, Reflexion
			Relaxation and facilitation of negative emotions	Practice of relaxation, Worksheet
			Writing down negative emotional experiences Ranking the negative emotions	
	Practice of forgiveness meditation (60 minutes)	Practicing and evaluating forgiveness meditation	Practicing forgiveness meditation	Practice
			Evaluation of practice	Reflexion, Q & A
	Closing (15 minutes)	Increasing participant involvement up to the next meeting	Assigning homework: Listening to the audio of forgiveness meditation Recording the evaluation of practice and self-monitoring	Lecture, Q & A
			Planning next meeting time and closing statement	Summarizing

Conted...

2 and 3 (90 minutes)	Opening (15 minutes)	Opening the 2 <sup>nd</sup> and 3 <sup>rd</sup> session of intervention	Opening and discussion of the practice experiences at home	Lecture, Q & A
	Practice of forgiveness meditation (60 minutes)	Practicing and evaluating forgiveness meditation	Practicing forgiveness meditation	Practice
			Evaluation of practice	Reflexion, Q & A
	Closing (15 minutes)	Increasing participant involvement up to the next meeting	Assigning homework (same as the assignment on the 1 <sup>st</sup> day)	Lecture, Q & A
			Planning next meeting time and closing statement	Summa- rizing
4 (90 minutes)	Opening (15 minutes)	Opening the 4 <sup>th</sup> session of intervention	Opening and discussion of the practice experiences at home	Lecture, Q & A
	Practice of forgiveness meditation (60 minutes)	Practicing and evaluating forgiveness meditation	Practicing forgiveness meditation	Practice
			Evaluation of practice	Reflexion, Q & A
	Termination of intervention (15 minutes)	Increasing participant involvement in the intervention independently	Encouraging participants to practice independently and on an ongoing basis Closing and termination of intervention.	Lecture, Summa- rizing

Forgiveness meditation was carried out in group, as many as four meetings in two weeks, with duration of 90-150 minutes. Forgiveness meditation was guided by a therapist that was a clinical psychologist who had had at least five years of practicing experience. Forgiveness meditation was began by evoking negative experiences through reflection and relaxation techniques, followed by practice of forgiveness meditation performed periodically. Participants were given the audio recording of forgiveness meditation instruction as a means to assist the daily practice before the subsequent meeting. Participants were also asked to complete a diary that aimed to self-monitor and evaluate each time the practice ended. Table 1 shows the overall procedure of forgiveness meditation in this study.

## RESULTS AND DISCUSSIONS

Participants in this study consisted of 78% female (N=7;  $M_{age} = 20.86$ ;  $SD_{age} = .38$ ) and 22% male (N=2;  $M_{age} = 20$ ;  $SD_{age} = 0$ ). Descriptive statistics in Table 2 show a decrease in GHQ-12 mean score from pretest to posttest which also indicates a decrease in distress. The decrease

in distress is supported by the decreased of mean score in each dimension (ie social dysfunction, anxiety and depression, and loss of confidence). While a comparison between posttest and follow-up measurements indicates that the effect of the intervention can be maintained until two weeks after treatment ended.

The results of Wilcoxon t-test between pretest and posttest using SPSS 22, as listed in Table 3, shows a significant decrease in GHQ-12 mean score ( $Z = -2.670$ ;  $p = .008$ ), on the social dysfunction dimension ( $Z = -2.533$   $p = .011$ ), and on the dimension of anxiety and depression ( $Z = -2.446$ ;  $p = .014$ ). Conversely, the decrease in the mean score on the dimensions of loss of confidence is not significant ( $Z = -1.838$ ;  $p = .066$ ). However, the decrease in the mean score from the pretest to the follow-up on all measurements is significant (GHQ-12 with  $Z = -2.675$ ,  $p = .007$ ; social dysfunction dimension with  $Z = -2.694$ ,  $p = .007$ ; dimension of anxiety & depression with  $Z = -2.273$ ,  $p = .023$ , and dimension of loss of confidence with  $Z = -2.716$ ,  $p = .007$ ). Furthermore there is no significant difference between posttest and follow-up on any measurement.

**Table 2: Descriptive statistics of measurement results**

No.	Initial	Sex	Age	Total Score GHQ-12			Dimensions								
							Social Dysfunction			Anxiety & Depression			Loss of Confidence		
				Pre-	Post-	FU	Pre-	Post-	FU	Pre-	Post-	FU	Pre-	Post-	FU
1.	FI	F	21	12	9	7	6	6	4	5	2	3	1	1	0
2.	IS	F	21	14	6	8	8	1	3	2	4	4	4	1	1
3.	AL	F	21	18	10	7	10	3	4	6	3	3	2	4	0
4.	EL	F	20	13	3	1	6	3	1	5	0	0	2	0	0
5.	IN	F	21	17	11	10	8	7	6	6	3	3	3	1	1
6.	AR	F	21	11	1	4	7	0	4	2	0	0	2	1	0
7.	ME	F	21	13	6	6	10	6	5	2	0	1	1	0	0
8.	DI	M	20	19	3	3	9	3	3	6	0	0	4	0	0
9.	ZU	M	20	20	7	11	11	3	6	6	2	4	3	2	1
Mean		20.67		15.22	6.22	6.33	8.33	3.56	4.00	4.44	1.56	2.00	2.44	1.11	0.33
Std. Dev.		0.50		3.31	3.42	3.24	1.80	2.35	1.58	1.88	1.59	1.73	1.13	1.27	0.50
Minimum		20		11	1	1	6	0	1	2	0	0	1	0	0
Maximum		21		20	11	11	11	7	6	6	4	4	4	4	1

**Table 3: Inferential statistics of measurement results**

		Posttest-Pretest	Follow-Up-Pretest	Follow-Up-Posttest
<b>Total Score GHQ-12</b>	Z	-2.670 <sup>b</sup>	-2.675 <sup>b</sup>	-.256 <sup>c</sup>
	Asymp. Sig. (2-tailed)	.008	.007	.798
<b>Social Dysfunction</b>	Z	-2.533 <sup>b</sup>	-2.694 <sup>b</sup>	-.566 <sup>c</sup>
	Asymp. Sig. (2-tailed)	.011	.007	.572
<b>Anxiety &amp; Depression</b>	Z	-2.446 <sup>b</sup>	-2.273 <sup>b</sup>	-1.633 <sup>c</sup>
	Asymp. Sig. (2-tailed)	.014	.023	.102
<b>Loss of Confidence</b>	Z	-1.838 <sup>b</sup>	-2.716 <sup>b</sup>	-1.890 <sup>b</sup>
	Asymp. Sig. (2-tailed)	.066	.007	.059
a. Wilcoxon Signed Ranks Test				
b. Based on positive ranks.				
c. Based on negative ranks.				

The result of this study supports the efficacy of forgiveness meditation intervention in reducing psychological distress, particularly in university students in their emerging adulthood, when research on this intervention is still quite limited. Explanation of the proven hypothesis that has been proposed in this study can be reviewed from various sides related to psychological distress.

Mastery of life stress, especially the adverse life event, has a protective effect that buffers the lack of adjustment to psychological distress<sup>35</sup>. In contrast, psychological problems develop as a result of low level

of emotion regulation and distress tolerance<sup>36</sup>. The emergence of internalizing problems (ie depression and anxiety) and externalizing problems (ie substance abuse), as well as the presence of worse coping strategies, are associated with poor emotion regulation<sup>37</sup>. In times of adverse life experiences impacting low level of emotion regulation, concurrent cognitive processing in the form of expressive suppression and rumination also contributes to the emergence of psychological distress<sup>3</sup>. Psychological responses also influence physiological reactivity<sup>38,39</sup>, so that decisions under distress becomes more difficult and not adaptive<sup>39</sup>.

The function of factors associated with psychological distress above may seem to be improved through meditation practice. Previous researches have supported that meditation improves brain functioning by increasing brain integration and restoring working memory, improves positive affect and emotional functioning, improves self-regulation, as well as reduces stress reactivity and psychological distress<sup>27,40,41</sup>. Changes that occur in terms of improvement of cognitive, emotional, and even physiological functioning further help improve coping strategies to be more adaptive<sup>42</sup>.

Meditation practice has also been shown to improve positive characteristics such as gratitude<sup>40</sup> and forgiveness<sup>28</sup>. Forgiveness which is also a concern in intervention in this study, separately from meditation has also been widely studied, both as a form of intervention based on forgiveness and as a positive psychological construct. Beyond the general usage of this term in an interpersonal context, forgiveness is agreed as an intrapersonal process<sup>43</sup>. The benefits of forgiveness extend beyond the dissipation of anger and hostility<sup>44,45</sup>. Forgiveness is effective in reducing stress, distress, anxiety, and depression<sup>45,46</sup>, promoting positive affect<sup>45</sup> and in turn improves mental health and well-being<sup>45,47,48</sup>.

In addition, other studies also support forgiveness in overcoming cognitive and behavioral problems. Forgiveness as a coping response for negative peer experiences in early adolescence, as example, is positively associated with concurrent self-esteem and negatively associated with social anxiety. Cognitively, this is associated with less rumination when experiencing an offense<sup>49</sup>. Forgiveness also helps to overcome the feelings of shame and guilt that is often experienced by people with behavioral problems, as in the case of drug and/or alcohol problems, and are associated with better recovery<sup>50</sup>.

The implications of forgiveness also appear in physical health as indicated by fewer physical symptoms. Fewer physical symptoms are presented as a result of changes in overall reductions in blood pressure level, heart rate, and may aid in cardiovascular recovery from stress associated with higher rates of forgiveness<sup>44,51</sup>.

Finally, the benefits of forgiveness have been used extensively either in the scope or disposition of forgiveness of others in the context of interpersonal transgression, self-forgiveness against one's self mistake, and forgiveness of situation beyond one's control<sup>29,52</sup>.

Forgiveness meditation in groups can be applied in educational settings, in this case for university students as emerging adult who are at high risk of experiencing psychological distress. Forgiveness meditation may have sustainable and increasing effect if it is regularly practiced. The audio recording of instruction is expected to facilitate the practice carried out independently. Self-evaluation and self-monitoring are also expected to raise awareness of perceived change as a result of intervention. A sustained decrease in distress, which indicates the improvement of mental health, is further expected to support the improvement of physical health, adaptive adjustment, and optimal functioning.

Limitation in this study is still less attention to the long-term impact. The limited subject also influences the expansion of the use of this intervention in similar populations. Future study is expected to see the long-term impact of intervention on the reduction of distress, ie by taking follow-up measurements in longer time range. In addition, further researchers are expected to examine the efficacy of forgiveness meditation in a larger group, as well as consider the design of a double pretest or assigning a control group to provide a higher significance level.

## CONCLUSIONS

The result of this research showed a significant decrease in psychological distress after the treatment of forgiveness meditation ended, which indicated mental health improvement. The decrease in distress remained significant up to follow-up measurements, though the difference between posttest and follow-up was not significant. Additional results indicated a significant decrease in the dimensions of "social dysfunction" as well as the dimensions of "anxiety and depression" after treatment ended, up to follow-up measurement. While the mean decrease in the dimensions of "loss of confidence" was not significant after treatment ended, but then became significant in the follow-up measurements compared to pretest. Differences in posttest and follow-up on all dimensions were not significant.

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**Conflict of Interest:** We as the authors state that there is no conflict of interest in this article if published.

**Ethical Clearance:** Ethical clearance in this country is not commonly used in psychological intervention studies with minimal risk. Culturally speaking, meditation has become part of eastern people. This meditation technique is basically part of asian culture. There is no harm in this practice of forgiveness meditation. Conversely, the use of ethical clearance is generally carried out on research participants in the hospital to ensure that they are protected from the risk of harm. The participants in this study was willing to engage in interventions completely and voluntarily, as indicated by the signing of informed consent voluntarily. Preparation of the intervention module in this study was carried out carefully by involving expert judgment, trying it out to the similar participants, and paying attention to the therapist's qualifications.

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# Psychometric Measurement of Perceived Stress among Midwives at Primary Health Care Province of Central Java Indonesia

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## ABSTRACT

**Introduction:** Midwives at Primary Health Care (PHC) are a unique profession. They have some complex responsibilities and must standby 24 hours/day to provide medical and administrative maternal and child health care at PHC and community. In addition, the government regulation on PHC accreditation requires skills and concentration of midwives. These responsibilities are thought to contribute to the incidence of stress on them. Objectives: to determine characteristics of midwives and their relationship with perceived stress.

**Method:** The study included 231 midwives working with PHC from Province of Central Java who responded the online questionnaire for two weeks. A structured questionnaire was used to know midwives' characteristics and assessed perceived stress by perceived stress scale (PSS) instrument. The data was analyzed using SPSS version 20.

**Results:** Mean age of midwives are 40 years and they are working at accredited PHC ( 91.3%), only 36.8% who get a training of Basic Obstetric Neonates Emergency (BONE). Almost  $\frac{3}{4}$  midwives have perceived stress in the moderate category ( mean= 16.5 SD= 5.08 ). There were no significant correlation between variables age, number of patients per day, training of BONE, accreditation status of PHC and education with perceived stress ( $p > 0.05$ ). The correlation between administrative responsibilities by midwives and PSS scores was significant ( $p < 0.05$ ).

**Conclusions:** PSS was reliabel to measure perceived stress among midwives at PHC (Cronbach's Alpha  $> 0.7$ ). Future research should address to know what kind of administrative task that contribute perceived stress of midwives at PHC.

**Keywords:** *Perceived Stress Scale, Midwife, Primary Health Care ( PHC)*

## INTRODUCTION

A midwife is an individu a person, typically a woman, having been regularly accepted to a midwifery school programme that is based on the ICM Essential Competencies for Basic Midwifery Practice and the

structure of the ICM Global Standards for Midwifery School and is approve in the state where it is located, who has acquired the required qualifications to be registered and/or official licensed to practice midwifery and use the name 'midwife'; and who implement competence in the practice of midwifery.<sup>1</sup>

Midwives at Primary Health Care (PH<sup>2</sup>C) in Indonesian are a unique profession within healthcare. Midwife as health workers that have a role as Government spearhead in serving public health, especially in organizing midwifery service and woman reproduction. According to Permenkes RI Number HK.02.02/ Menkes/ 149/ 2010, than this profession must

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be doing by a woman. They must implement 9 main task. They have to do midwifery care toward pregnant woman (antenatal care), implementing physiological maternity care toward maternity woman (postnatal care), organizing service toward neonatal (neonatal care visits), efforting partnership cooperation with shaman maternity or traditional birth attendance in PHC working areas, giving education by reproductive health and midwifery counseling, implementing family planning care toward fertile age woman, implement tracking and referrals caring toward high risk pregnant woman, efforting "Audit Maternal Perinatal (AMP)" discussion in case of maternal and neonatal death, implementing integrated documentation and report.

There is a government regulation on accreditation of PHC for increasing PHC quality service have to be gained. PHC must be accredited periodically at least every 3 years. PHC accreditation required skills and concentration of midwives to implement their task both taking care for woman and child and administratively. This task according to midwife's role and authority as implementers, administrator, educators and investigator in the field of midwifery service. Midwives have some complex responsibilities. They must standby 24 hours/day to provide medical and administrative maternal and child health care at PHC and community. Midwife's workforce is suspected to be heavy because needed professional ability that demanding concentration and skills.<sup>2</sup>

Midwifery care had a important role in the reduction of maternal and newborn mortality and morbidity.<sup>3</sup> Mortality becomes one of the condition that causes stress and anxiety in the midwifery practice in developing countries. It can impair their cognitive function,<sup>4</sup> decision-making skills, safe and high-quality care so that affecting their professional quality of life and clinical practice.<sup>5,6</sup>

Midwives are subjected to multiple stressors,<sup>7</sup> resulted from physical, psychological and social aspects of the working environment.<sup>8</sup> The development of stress which may contributed by job demand, which is simply one of "psychosocial hazards".<sup>9</sup> High stress level were reported by 57% the community midwife (CMW).<sup>10</sup> Women reported significantly more stress than men.<sup>11</sup>

Measurement of stress using self report can be done quickly and equally for getting structured response.<sup>12</sup> Instrument Perceived Stress Scale (PSS) was developed

by Cohen in 1983 and it has shown sufficient reliability and validity to assessment of an individual's perception of psychological stress,<sup>13</sup> across both clinical and non-clinical samples.<sup>14</sup> The aim of this study was to determine characteristics of midwife and their relationship with perceived stress.

## METHOD

A cross-sectional study was conducted with the research subject. The study included 231 midwives were working with PHC from Province of Central Java Indonesia who responded the online questionnaire for two weeks goes throw Midwifery Association of Indonesian around central Java province. Midwifery is defined as "skilled, knowledgeable and compassionate care for childbearing women, newborn infants and families across the continuum from pre-pregnancy, pregnancy, birth, postpartum and the early weeks of life".<sup>15</sup> A structured questionnaire was used to collect data of demography, administrative responsibility and stress perception was assessed by instrument PSS. Measuring reliability of the PSS instrument by Cronbach's alpha test.

PSS was used to measure 10 stated items (1-10) of PSS that was based on 5 point Likert rating scale. Scaling: 0 = Never; 1 = Almost Never; 2 = Sometimes; 3 = Fairly often; 4 = Very often. There are four positively stated items (items 4, 5, 7, & 8) so the PSS scores were obtained by reversing responses (0 = 4, 1 = 3, 2 = 2, 3 = 1 and 4 = 0) and then summing across all scale items. Total individual score on the PSS 0 to 40. Lower scores indicating lower perceived.

Midwife have to be responsible for the clinical care administration. This describes the time that needed for documentation activities for each patient's data served by the midwife also the average of mother that served by the midwife for one week. The data gather time is adjusted to the working conditions of the midwife in Public Health Service areas, at that time midwife must making reports of service result in addition routine service activities, preparation of Public Health Service accreditation and implementation of healthy family registration program. The data was analyzed using SPSS version 20. The compare means test (independent t test & ANOVA) was used to compare category variables (BONE training, PHC status, education) for stress scores. The Pearson correlation test used to know correlation numeric variabel with stress scores.

## RESULTS AND DISCUSSIONS

Out of a total 421 midwives responded the online questionnaire, 231 answered completely the questionnaires on time ( 55%). PSS instrument was valid and reliable to measure perceived stress among midwives of PHC. (Cronbach's Alpha > 0.7)

The mean age of study subjects was 38.9 years old (SD= 7.6) and were working at accredited PHC status (91.3%). Only 36.8% who got a training of Basic Obstetric Neonates Emergency (BONE) and 61.9% was graduated education by Diploma of Midwifery Program ( Table 1).

**Table 1: Characteristics variables (n =231)**

Variables	Mean (SD)
Age, years	38.9 ( 7.6)
Administrative task of each patient (minute)	12.0 ( 6.2)
Number of patients each day	18.2 (22.7)
	<b>n (%)</b>
<b>Work at accredited PHC</b>	
Yes	211 (91.3)
No	20 ( 8.7)
<b>Training BONE</b>	
Yes	85 (36.8)
No	146 (63.2)
<b>Education</b>	
Diploma of Midwifery Program (D3)	143 (61.9)

Conted...

Applied Science of Midwifery Program (D4)	82 (35.5)
Bachelor (Masters)	6 ( 2.6)

Subject who answered "sometimes" to all item of PSS (1-10) questions is the largest percentage. The highest average score (mean=1.88; SD =1.05) to the question item. " In the last month, how often have you felt nervous and "stressed"?. Meanwhile, the less average score (mean=1.44; SD =0.96) to the question item " In the last month, how often have you felt confident about your ability to handle your personal problems?"

About three fourth subjects had perceived stress in the moderate category (75.8%). The mean perceived stress score of all was 16.5; SD= 5.08 ( Table 2). There were no significant correlation between variables age, number of patients each day, training of BONE , accreditation status of PHC and education with perceived stress (p > 0.05). The correlation between Administrative responsibilities by midwives and PSS scores was significant (p < 0,05). See table 3.

**Table 2: Variables by Score of PSS**

Variables	p
Age, years	0.86 <sup>a</sup>
Administrative responsibility	0.011 <sup>a</sup>
Number of patients each day	0.74 <sup>a</sup>
Work at accredited PHC	0.18 <sup>b</sup>
Training BONE	0.74 <sup>b</sup>
Education	0.99 <sup>c</sup>

<sup>a</sup> = pearson correlation <sup>b</sup> = t test <sup>c</sup> = anova test

**Table 3: Responses to the perceived stress score and category ( n = 231)**

No.	Statement	Never (0)	Almost never (1)	Some-times (2)	Fairly often (3)	Very often (4)	Mean (SD)
		n (%)	n (%)	n (%)	n (%)	n (%)	
1.	In the last month, how often have you been upset because of something that happened unexpectedly?	28 (12.1)	51 (22.1)	111 (48.1)	31 (13.4)	10 (4.3)	1.76 (0.98)
2.	In the last month, how often have you felt that you were unable to control the important things in your life?	48 (20.8)	72 (31.2)	84 (36.4)	24 (10.4)	3 (1.3)	1.46 (0.97)
3.	In the last month, how often have you felt nervous and "stressed"?	25 (10.8)	53 (22.9)	93 (40.3)	45 (19.5)	15 (6.5)	1.88 (1.05)

Conted...

4.	In the last month, how often have you felt confident about your ability to handle your personal problems?	38 (16.5)	88 (38.1)	75 (32.5)	25 (10.8)	5 (2.2)	1.44 (0.96)
5.	In the last month, how often have you felt that things were going your way?	21 (9.1)	71 (30.7)	105 (45.5)	28 (12.1)	6 (2.6)	1.68 (0.89)
6.	In the last month, how often have you found that you could not cope with all the things that you had to do?	17 (7.4)	62 (26.8)	112 (48.5)	35 (15.2)	5 (2.2)	1.78 (0.86)
7.	In the last month, how often have you been able to control irritations in your life?	28 (12.1)	77 (33.3)	99 (42.9)	24 (10.4)	3 (1.3)	1.55 (0.88)
8.	In the last month, how often have you felt that you were on top of things?	23 (10.0)	81 (35.1)	99 (42.9)	27 (11.7)	1 (0.4)	1.58 (0.84)
9.	In the last month, how often have you been angered because of things that were outside of your control?	15 (6.5)	65 (28.1)	102 (44.2)	42 (18.2)	7 (3.0)	1.83 (0.9)
10.	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	23 (10.0)	71 (30.7)	111 (48.1)	21 (9.1)	5 (2.2)	1.63 (0.87)
<b>Perceived stress</b>			<b>n (%)</b>		<b>mean (SD)</b>		
Low stress (Scores 0-13)			53 (22.9)				
Moderate stress (Scores 14-26)			175 (75.8)				
High stress (Scores 27-40)			3 (1.3)				
Scores					16.5 (5.1)		

The aim of this study was determine characteristics of midwives and their relationship with perceived stress. The results show mean age of subject (38.9 year olds) was a working age as those a 15 to 64 year olds. The literature review noted that age might contribute some components of the stress process at work.<sup>16</sup> The number of patient should be care for is related to the time that to be used of midwife in administration tasks. For example, documentation about the data of midwifery care. Midwifery documentation is one of recording and reporting of midwifery care as a professional midwife. It is a crucial for them to know and understand what they had done and the important thing on documentation as a legal aspect.<sup>17</sup>

The responsibility on the administration tasks is correlated to perceived stress of midwives The ability in documentation and administration impacts to the quality of midwifery clinical practice. It is doing by midwife in order to reduce the maternal and infant mortality rate. In addition, it can prevent in increasing the number of midwifery cases that supporting MMR, such as postpartum hemorrhagic, preeclampsia, and other pregnancy complications. So that, it is a need to improve

the educational background of midwife especially at Primary Health care. Most of midwives who work at accredited PHC and nor have to be as a professional midwife as their level of education and competencies. Studies have shown that competent midwives can provide 87% of essential cares for women and babies.<sup>18</sup> It is a prove that midwives whoa have high educational background in midwifery, in house training, and have a licensed midwife have a positive impact on the quality of midwifery services. It is hoped that it can reduce quickly the maternal and infant Mortality rate.<sup>19</sup> One of in house training to improve the level of knowledge on reproductive in health care and community based is training BONE. The goals are to prevent maternal mortality rate and infat moratlity rate. The training was arranged to prepare health care provider to manage maternal and neonatal Emergencies cases at the primary health services level. Providers skilled in BONE services might be essential, especially in countries with a high burden of maternal and newborn mortality.<sup>20</sup> All midwives felt guilty if they faced on maternal death. The level of anxiety at the highest score (93%).<sup>5</sup> Anxiety is a pchycological respon from stress.<sup>8</sup> PSS instrument gives a lot of information about the midwife's level of stress

and nervous during they work in PHC, involving less and moderate level of stress.

## CONCLUSION

Psychometric measurement by PSS was valid and reliable to measure perceived stress among midwives who worked at PHC (Cronbach's Alpha > 0.7). Future research should address to know what kind of administrative task that contribute perceived stress of midwives at PHC.

**Conflict of Interest:** There are no conflict of interest

**Ethical Clearance:** This study received ethical approvals from the Public Health Faculty University of Diponegoro (No: 053/EC/FKM/2018)

**Source of Funding:** Self

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# Is Nutritional and Socioeconomic Status Related with Tooth Eruption of First Incisive Permanent Mandibular among School and Special Need Students?

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## ABSTRACT

Permanent tooth replacement is an important process which stimulate children growth and development. The first permanent eruption tooth is first Incisive of lower jaw (I1 LJ). The eruption time of each child is different, divided into premature loss, on time and delayed which influenced by several factors include nutrition of children and parents socioeconomic status (SES). Purpose of research was to find relation of eruption time of I1 LJ based on nutritional and economic status on school and special need students. Research design was analytic observational with cross sectional approach. Sample was 58 children aged 6-7 years old, divided into two groups 29 school students and 29 students with special need. Questionnaire was used to measure economic status, nutrition status measured by weighed height and weight and also an interview was done to find time tooth eruption. Spearman and Mann Whitney was used as a statistical tool. There was a difference of nutritional and economic status of normal and special need students (Sig: 0.045 and 0.04). There was a different of timing tooth eruption of both groups with Significance of 0.03. There was a relation of nutritional and economic status with timing of tooth eruption (Sig: 0.001 and 0.04). Most of school students had normal nutritional status with on time tooth eruption while on students with special need had o nutritional status, delayed tooth eruption. Children with good nutrition and economic status will influence their physical growth. Children with special need usually has systemic disease which influence their growth. Nutritional and economic status related with timing of I1 LJ on school and special need students.

**Keywords:** *Nutritional, economic status, First Incisive Permanent Lower Jaw, Eruption, students with special need*

## INTRODUCTION

Dental eruption is a state of tooth appearance between gums in the oral cavity. Tooth eruption begins after the formation of crown followed by root formation during the tooth life and continues even though the tooth has reached occlusion with its antagonist.<sup>1</sup> Permanent teeth eruptions is gradually with age. The first permanent tooth appears in the oral cavity is the first permanent Incisive mandible at the age of 6-7 years.<sup>2</sup> Every child's

teeth eruptions are not always the same, some are too fast, some are on time and some are delayed. Teeth that appear prematurely are called premature and teeth that appear late are called retardations.<sup>3</sup> Factors affecting tooth eruption include heredity, race factor, gender, nutrition, premature birth, socioeconomic , height and weight, hormones, and systemic diseases.<sup>4</sup> In one study there was a significant correlation between nutritional status with permanent teeth eruption in elementary school students with good, fat and overweight nutritional status more have permanent teeth erupted on time according to age compared to those skinny.<sup>5</sup> A research conducted by Clements and Thomas found students with higher social economic background show earlier tooth eruption than students with low social economic status.<sup>6</sup> Growth of students are divided into normal and special need students. Students with special needs are those who need special care related to their specialty permanent or temporary.<sup>7</sup> Studies earlier were conducted at students

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at elementary school. No study found which compare timing tooth eruption of group students at elementary students and school of students with special need. Purpose of recent study was to compare socioeconomic background, nutritional status and timing of eruption first Incisive lower jaw at students elementary school (SD Sendang Mulyo 01 Semarang Indonesia) and students with special need (SLB Negri Semarang Indonesia).

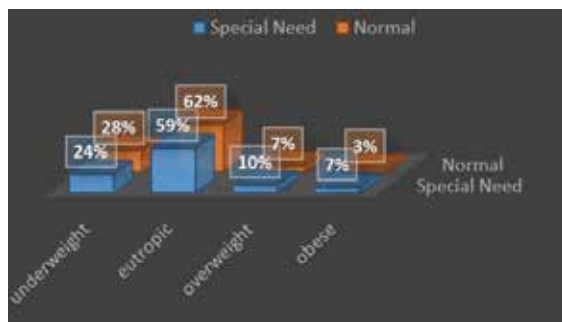
**METHOD**

Research design was observational analytic with cross sectional design was a research approach. Research population was 105 elementary students SD N Sendangmulyo 01, Tembalang Semarang (Normal students) and 35 students with special need at SLB Semarang. Both group was students at 6-7 in age. Sample size was determined with Slovin formula and found 29 students each group with random sample collection. Instruments used for measuring socioeconomic status (SES) was questionnaire which asked about parents salary and number of family and broken into two middle down and middle up. Body Mass Index (BMI) was calculated using individual height, weight, age and gender as variables to determine nutritional status and classified into four as follows BMI z-score <-2; percentile 0 +1 and ≤ +2; percentile > 85 and ≤ 97: overweight; • BMI z-score > +2; percentile > 97: obese.<sup>7</sup> To determine differences of SES, nutritional status and timing II LJ eruption at normal and special need students was evaluated using Chi Square test and to find association of SES, nutritional status with II LJ eruption using Spearman test.

**RESULTS AND DISCUSSIONS**

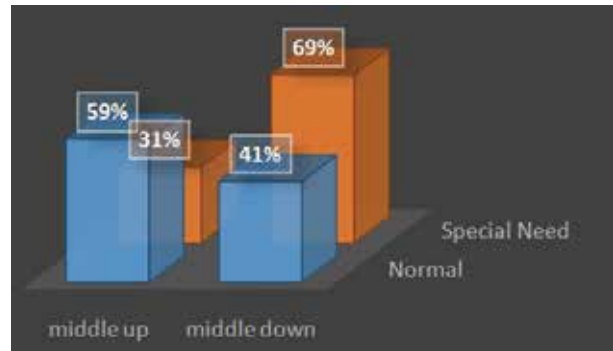
Result of data collection is displayed descriptively as follows:

**a. Univariate**



**Figure 1: Distribution Frequency of nutritional status of normal and special need students**

Most of school and special need students are at normal weight, however 17% of students with special need are classified as overweight.



**Figure 2: Distribution Frequency of socioeconomic background of normal and special need students**

The figure shown school students are most at middle up socioeconomic background while at special need students are more at middle down category.



**Figure 3: Distribution Frequency of timing I1 Lower Jaw of normal and special need students**

Figure describe frequency of eruption of first incisive lower jaw of school students 76% are on time in emergence. Students with special need has different figure, their timing eruption of first incisive are more delayed (48%).

**b. Bivariate:** Result of differences and association between variables are as follows:

Table 1 shown number of students with special need is higher at middle down socioeconomic status than normal students, otherwise economic background of normal students is more at middle up. Variable nutritional status showed most students at normal weight both group, however number of overweight and obese is more at special need students. There was no differences at nutritional status and socioeconomic background of both group.

**Table 1: Differences of Socioeconomic and Nutritional status of special need and normal students**

	Special need	Normal	P value
<b>Socioeconomic status</b>			
a. middle up	9	17	0.04*
b. middle down	20	12	
<b>Nutritional status</b>			
a. underweight	6	8	0.06
b. Normal	17	18	
d. Overweight	3	2	
e. Obese	2	1	

\*Chi Square significant at  $p \leq 0.05$

Differences of time eruption of Incisive 1 Lower jaw of normal and special need students is presented at table 2. Most students with special need is delayed at their I1 mandibular emergence, otherwise most normal students is emerged on time age.

**Table 2: Differences of First Incisive Permanent Mandibular eruption of special need and normal students**

Timing I1 LJ eruption	Special need	Normal	P value
Earlier	2	2	0.03*
On Time	15	22	
Delayed	12	5	

\*Chi Square significant at  $p \leq 0.05$

Relationship of nutritional status and SES with eruption time of I1 LJ of special need students is showed at table 3. Students at middle down SES has delayed tooth eruption while those who has middle up economic their I1 timing eruption is earlier and on time. It can be seen that a relation of socioeconomic background and nutritional status

**Table 3: Associations of nutritional status and socioeconomic status with Timing of I1 LJ eruption of Special need students**

Variables	Timing of I1 LJ Eruption			P Value
	Earlier	On Time	Delayed	
<b>Socioeconomic Status</b>				
a. middle up	2	7	0	0.04*
b. middle down	0	8	12	

Conted...

<b>Nutritional status</b>				0.001*
a. Underweight	0	0	7	
b. Normal	0	11	6	
c. Overweight	1	2	0	
d. obese	1	0	1	

\*Spearman significant at  $p \leq 0.05$

Relationship of nutritional status and socio economic background is clearly seen on table 4 which has p value  $\leq 0.05$  which mean two variables relate with time of eruption Incisive 1 lower jaw at special need students.

**Table 4: Associations of nutritional status and socioeconomic status with Timing of I1 LJ eruption of normal students**

Variables	Timing of I1 LJ Eruption			P Value
	Earlier	On Time	Delayed	
<b>Socioeconomic Status</b>				
a. middle up	2	7	0	0.04*
b. middle down	0	8	12	
<b>Nutritional status</b>				
a. Underweight	0	5	3	0.001*
b. Normal	0	16	2	
c. Overweight	1	1	0	
d. obese	1	0	0	

\*spearman significant at  $p \leq 0.05$

**a. Differences of socioeconomic and Nutritional status of special need and normal students:**

There was a difference in nutritional status of normal students and students with special needs due to their growth are different. Special need students include deaf, blind, disabled students have physical abnormalities that will affect the food consumption and fulfillment of nutrition. Disabled students are known to be at high risk for developing malnutrition, which may partly explain the growth retardation often encountered in such students.<sup>8</sup> The most common problems associated with malnutrition in disabled students, are inadequate nutrient intake either due to feeding problems or poor feeding knowledge among care providers.<sup>9</sup> This result in accordance with another research which explain lack of nutritional rate

special need students.<sup>10</sup> There was a differences of nutritional status of special need and normal students. Socioeconomic status is a form of family lifestyle, adequate family income can meet nutritional needs of students because all the necessary substances needed by the body can be fulfilled better life and health services, therefore will support the growth and development of students. Poverty is one of the factors which cause students experiencing disability disorders, due to low socioeconomic level can affect the lack of nutritional fulfillment.<sup>11</sup>

**b. Differences of first Incisive Permanent mandibular eruption of special need and normal students:**

Students with special needs tend to experience delays of tooth eruption (48%). Tooth delay may be affected by late eruption of the deciduous tooth and ultimately affects the permanent tooth eruption. Premature birth is also one of the factors that make late eruption when eruption of deciduous teeth in premature birth students is slower than normal child.<sup>12</sup> Delay in the eruption of the deciduous tooth also affects permanent tooth eruption as the result of the study says the time of permanent tooth eruption is related to the eruption of the deciduous teeth. Slow or faster eruption of the first tooth in a mouth resulting of delayed or faster eruption.<sup>13</sup> The period of eruption of teeth in normal students with students with special needs has differences in terms of factors that affect the delay of eruption of teeth which states one of the factor is a child syndrome down.

**c. Associations of nutritional status and socio economic status with Timing of IJ eruption of Special need and normal students:**

There was a relationship of nutritional status and socio economic status with time of first permanent eruption both on special need students and normal students. The nutritional status of students is strongly influenced by food intake and the frequency of food that will support growth. Growth of students with special needs is same with normal students only they have shortcomings at their physical ability which may affect their intake. Based on the research there are several factors that can affect the growth of the permanent teeth in students, include gender, nutrition, premature birth, socioeconomic factors,

height and weight, hormones, and systemic diseases. A research found similar result which found poor nutrition affect tooth eruption and resulted in delayed emergence of teeth.<sup>14</sup> This study conducted at Sumatra Indonesia found a relation on nutritional status and permanent eruption of first molar lower jaw at elementary students (normal students). The teeth eruption is influenced by several factors which include nutritional, hormonal, hereditary or genetic factors.<sup>15</sup> Socioeconomic and nutritional factors have also been found to have some effect on the eruption of permanent teeth. Students from high social economy has earlier tooth emergence, the reason students has better health care and affect their tooth development.<sup>16</sup> Normal students are students at Elementary Scholl Tembalang Semarang which most of them are middle up family, otherwise special need students are students aged 6-7 years old which most of them are from middle down family. Lower social economy will affect the first Incisive permanent lower jaw eruption. On contrary a research revealed that there is no correlation of timing of the eruption of permanent teeth with the nutritional status of an individual.<sup>17</sup>

## CONCLUSIONS

1. There was a difference in nutritional status of school students and students with special needs, school students are more at normal weight compared to special need students which are more overweight
2. There was difference socioeconomic background of school students and students with special needs, school students are more at middle up socio economic background
3. There was a Differences of First Incisive Permanent Mandibular eruption of special need and normal students. Time of eruption of school students are more on time than special need children are delayed tooth eruption
4. Nutritional status and socioeconomic background related with eruption of first Incisive lower jaw

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**Conflict of Interest:** There is no conflict of interest related with this publication.

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# Survey of Satisfaction on School Health Unit Service at Elementary School

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## ABSTRACT

**Background:** Various kinds of health problems appear in children aged elementary school, but the usual problems that are related to healthy life behavior. School Health Unit (Usaha Kesehatan Sekolah = UKS) is one of the vehicle to improve health degree of students. The purpose of this study was to analyze the level of satisfaction of students, UKS's teachers, and parents of school health unit consisting of services: health education, health service and healthy school environment at the elementary school in work area of Public Health Center Kedungmundu Semarang.

**Method:** This research is a descriptive research, which is a type of conclusive design that aims to describe the character or function of research on a group. Descriptive analysis conducted to illustrate the gap between the importance and satisfaction of the school community on the effort of implementing the school health unit. To know the level of customer service satisfaction, used Gap Analysis and Cartesius Diagram.

**Result:** The result was that the students were satisfied with the school health service because two of the best items were health education and anthropometric measurement. UKS's teachers are satisfied with the service of School Health Unit because the two best items are the counseling and directing on the implementation of health education as well as the variables of guidance and guidance on the implementation of health services. The parents are satisfied with the service of School Health Unit because the two best items are student's knowledge about healthy life behavior variable and habit of healthy daily living variable.

**Keywords:** *Satisfaction, School Health Unit, Services*

## INTRODUCTION

One of the serious problems facing Indonesian nation is health problem especially health problem of school age children. The population of primary school-aged children is an important component in the community, given the large number of about 23% or one-third of the total population of Indonesia. Common health problems that occur in school-age children are usually related to personal hygiene and environment such as brushing teeth in right way, personal hygiene, and handwashing

habits.<sup>1)</sup> One of the containers to develop the promotion of Healthy Living Behavior (Perilaku Hidup Bersih dan Sehat = PHBS) of school-aged children is the School Health Unit (Usaha Kesehatan Sekolah = UKS) Service

UKS is part of the school-age health program which has three main programs: health education, health services and healthy school environment.<sup>2)</sup> According to Surat Keputusan Bersama Kementerian Pendidikan, Kementerian Kesehatan dan Kementerian Agama Republik Indonesia No : 1 / U / SKB / 2003 No : 1067 / Menkes / SKB / VII / 2003 No : MA / 230 A / 2003 No : 26 Tahun 2003 Tanggal 23 Juli 2003 tentang Pengembangan dan Pembinaan UKS, UKS is an integrated effort in order to improve the ability of healthy life which then form the healthy behavior of school-aged children who are in school. UKS plays a role in providing health-related knowledge to the students so that in the future it is hoped that they can practice healthy lifestyle everywhere.<sup>3)</sup>

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The UKS service includes public services, with school community service users including: Students, UKS's Teachers and Student Parents. One of the efforts that must be done in the improvement of public services is to conduct a Public Satisfaction Survey to service users.<sup>4)</sup> By knowing the level of school community satisfaction to the service of UKS, will be able to improve the quality of service, so hope to improve healthy life behavior among elementary school student can be achieved.<sup>3)</sup>

The purpose of this research is to know the satisfaction of school society consisting of: students, UKS's teachers, and parents on the quality of UKS Service.

## METHOD

This research is an observational research which the data is analyzed by Frequency and Descriptive to describe gap (gap) between interest / expectation and performance / customer satisfaction toward service

quality of School Health Enterprises.<sup>5)</sup> To know the level of customer service satisfaction, used Gap Analysis and Cartesius Diagram.<sup>6)</sup>

The population of this research is the community of elementary schools in the work area of Public Health Center Kedungmundu Semarang in 31 schools. So the respondents of this study include: 31 students (one student from each school), who was accompanied by 31 parents, and 31 teachers of UKS coach.

## RESULTS AND DISCUSSIONS

### 1. Actual and Expectations of Respondents (Students) to School Health Unit Services: In

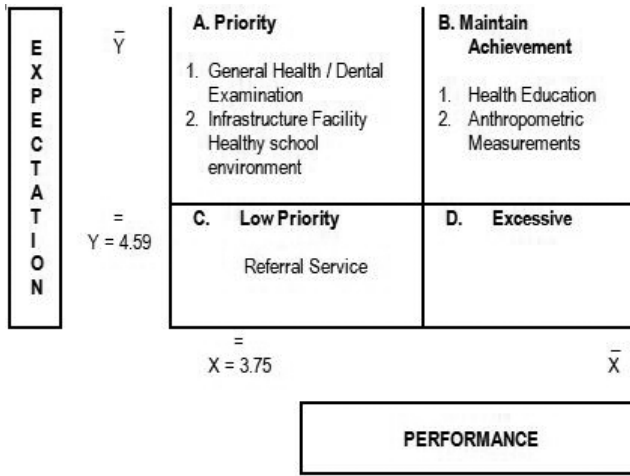
this study, respondents were asked to assess the importance and performance of School Health Unit Enterprises in the provision of services that include: health education services, health services, and healthy school environments. The results are as follows:

**Table 1: Student Satisfaction Analysis of School Health Unit Service**

No.	Component of	Service Quality	Category	Satisfaction Level	Category	Degree of Conformity (%)
1.	Health education about disease, its causes and prevention	4.65	Very important	3.82	Satisfied	82.11
2.	Health education about Healthy Living Behavior	4.59	Very important	3.77	Satisfied	82.24
3.	Health education about clean and healthy environment	4.56	Very important	3.87	Satisfied	84.90
4.	Health education on nutrition and healthy food	4.62	Very important	3.84	Satisfied	83.13
5.	Anthropometric Measurement	4.58	Very important	3.83	Satisfied	83.55
6.	General Health/Dental Examination	4.57	Very important	3.77	Satisfied	82.55
7.	Referral service	4.57	Very important	3.62	Satisfied	79.09
8.	Adequate school infrastructure and school environment	4.55	Very important	3.51	Satisfied	77.31
	Average	4.59	Very important	3.75	Satisfied	81.87

Next, the average value of importance and performance is analyzed on the Importance-Performance Matrix, in which the x-axis represents perception whereas the y-axis represents expectations. Then the results obtained in the form of images as follows:





**Figure 1: Cartesian Diagram of Service Quality and Student's Performance/Satisfaction of School Health Unit Service**

Based on the calculation of student satisfaction scores that have been done can be known two best items include health education and anthropometric

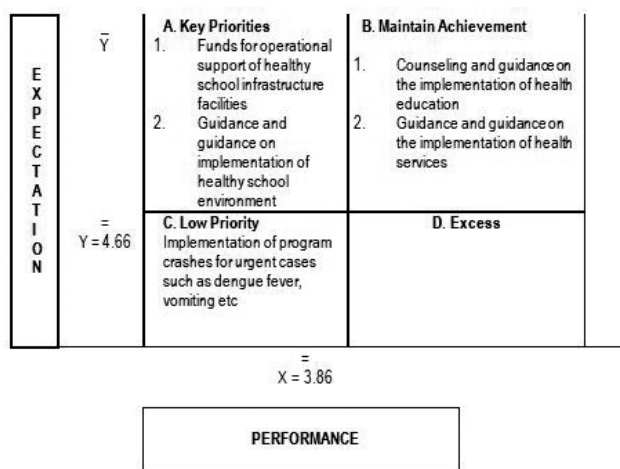
measurement conducted by UKS in the working area of Public Health Center Kedungmundu Semarang. With the analysis of Importance - Performance Analysis (IPA), it can be seen that the things that must be improved in the future, include: general and dental health check up service and healthy school environment facilities.

**2. Actual Performance and Expectations of Respondents (UKS's Teachers) to School Health Unit Services:** In this study, respondents were asked to assess the importance and performance of School Health Unit Enterprises which include: counseling and directing the implementation of health education, guidance and direction on the implementation of health services, guidance and direction the implementation of healthy environment coaching, operational funds funding infrastructure of healthy schools, and the implementation of crash programs for urgent cases such as dengue fever, vomiting etc. The results are as follows:

**Table 2: Analysis of UKS Teacher Satisfaction with School Health Service**

No.	Component of	Quality Service	Category	Satisfaction	Category	Level Degree of conformity (%)
1.	Guidance and direction on health education implementation	4.68	Very Important	4.05	Satisfied	86.57
2.	Guidance and direction on implementation health services	4.55	Very Important	3.88	Satisfied	85.28
3.	Guidance and guidance on the implementation of healthy school environment	4.66	Very Important	3.66	Satisfied	78.49
4.	Operational fund for healthy school infrastructure	4.73	Very Important	3.89	Satisfied	82.41
5.	Implementation of program crashes for urgent cases such as fever bleeding, vomiting etc.	4.70	Very Important	3.81	Satisfied	80.98
6.	Average	4.66	Very Important	3.86	Satisfied	82.73

Furthermore the average value of importance and performance is analyzed on Importance-Performance Matrix, where the x axis represents perception whereas the y-axis represents expectation. The results obtained in the form of drawings as follows:



**Figure 2 :Cartesian Diagram of Service Quality and Performance/ Satisfaction of UKS’s Teachers toward School Health Unit Services**

Based on the results of the calculation of satisfaction scores UKS’s teachers who have done can be known two best items, that are the guidance and direction of

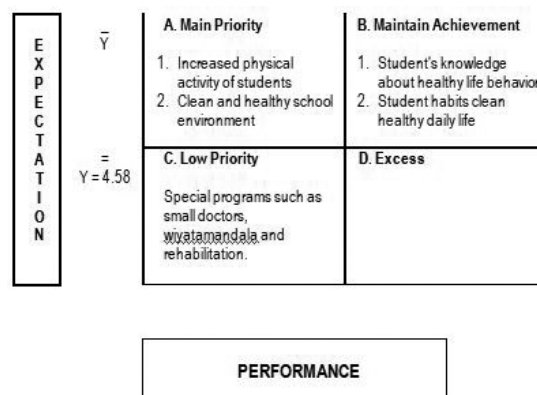
the implementation of health education and guidance on the implementation of health services conducted by School Health Unit Services . With the analysis of Importance - Performance Analysis (IPA), it can be seen that there are still things that must be improved in the future, namely: Operational Funds for the facilities of healthy school infrastructure and guidance and direction on the implementation of healthy school environment.

**3. Actual Performance and Expectations of Respondents (Parents) to School Health Unit Services:** In this study, respondents were asked to assess the importance and performance of School Health Efforts that include: Students ‘knowledge of healthy living behaviors, healthy students’ daily hygiene habits, increased physical activity of students , clean and healthy school environment as well as special programs such as school’s cadre, field trip and rehabilitation service. The results are as follows:

**Table 3: Parents Satisfaction Analysis of School Health Unit Service**

No.	Component	Quality of Service	Category	Satisfaction	Category	Level Degree of Conformity (%)
1.	Student’s Knowledge of Healthy Living Behavior	4.59	Very Important	3.78	Satisfied	82.22
2.	Student Habits Clean Healthy Day -days	4.54	Very Important	3.63	Satisfied	79.85
3.	Increased student physical activity	4.58	Very Important	3.80	Satisfied	82.85
4.	Clean and healthy school environment	4.63	Very Important	3.85	Satisfied	83.13
5.	Special programs such as school’s cadre, field trip and rehabilitation service	4.54	Very Important	3.70	Satisfied	81.60
6.	Average	4.58	Very Important	3.75	Satisfied	81.94

Furthermore the average value of importance and performance is analyzed on the *Importance-Performance Matrix*, where the x-axis represents perception whereas the y-axis represents expectations. Then the results obtained in the form of images as follows:



**Figure 3: Cartesian Diagram of Service Quality and Performance/Parents Satisfaction to School Health Unit Services**

Based on the results of the calculation of parents' satisfaction scores that have been done can be known two best items, that are student knowledge about the healthy life behavior and student's clean healthy living everyday. With the analysis of Importance-Performance Analysis (IPA) it can be seen that things that still need to be improved in the future, are the increase of physical activity of students and school environment clean and healthy.

The theory of customer satisfaction and dissatisfaction is formed from the expectation disconfirmation model, which explains that customer satisfaction or disparity is the impact of the comparison between customer expectations before the actual purchase obtained from the customer of the product or service.<sup>7)</sup> Customer expectations when buying actually consider the function of the product (product performance). Product functions include:<sup>8)</sup>

1. Product can function better than expected, called positive disconfirmation (*positive disconfirmation*). When this happens then the customer will feel satisfied.
2. The product can work as expected, called *simple confirmation*. The product does not give a sense of satisfaction and the product does not disappoint so the customer will have a neutral feeling.
3. Product can function worse than expected, called negative disconfirmation (*negative disconfirmation*). When this happens it will cause disappointment, so that customers feel not satisfied.

In this study the student respondents were satisfied with the school health service because two of the best items were health education and anthropometric measurement. This means students perceive the school health unit service in health education services and anthropometric measurements to function better than expected, or called positive disconfirmation.<sup>9)</sup>

To note, customer satisfaction is the result of accumulation from consumers or customers in using products and services.<sup>10)</sup> Therefore, any transaction or new experience, will have an effect on customer satisfaction. Similarly, customer satisfaction has a time dimension because of the result of accumulation. Therefore, whoever is involved in customer satisfaction,

he has been involved in long-term affairs. The effort to satisfy the customer is a long experience that knows no deadline.<sup>11)</sup>

In this research, UKS's teacher are satisfied with the services of School Health Unit because the two best items are the guiding and directing on the implementation of health education as well as guidance on the implementation of health services. So it can be said that the two items mentioned above have a good quality of service so as to meet the expectations of respondents, in this case the UKS's teachers.

The respondents of parents are satisfied with the service of School Health Unit Service because the two best items are student's knowledge about healthy life behavior and healthy daily living. So it can be said that the two items mentioned above have a good quality of service so as to meet the expectations of respondents, in this case the parents of students.

Quality of service is the level of excellence expected and control over the level of excellence to meet customer desires.<sup>(12,13)</sup> In other words, there are two main factors that affect the quality of services, namely expected service and perceived service.<sup>14)</sup> If the service received or perceived (service perceived) in accordance with the expected, then the quality of services perceived good and satisfactory. If the service received exceeds the customer's expectations, then the quality of service is perceived as the ideal quality. Conversely, if the service received is lower than expected, then the service quality is perceived poorly. Thus, whether the quality of services depends on the ability of service providers to meet customer expectations consistently.<sup>15)</sup>

## Conclusions

1. The student were satisfied with the school health unit service because two best items were health education and anthropometric measurement.
2. UKS's teacher are satisfied with the service of School Health Unit Service because two best items are the counseling and directing on the implementation of health education as well as guidance on the implementation of health services.
3. The parents are satisfied with the service of School Health Unit Service because the two best items are student's knowledge about healthy life behavior and healthy daily living.

**Conflict of Interest:** Nil

**Ethical Clearance:** Taken from Bioethics Committee Medical Faculty of Islamic University Sultan Agung (UNISSULA) Semarang

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# Effectiveness of Disinfectant A and B on the Growth of Bacteria in the Area of Central Surgical Installation of Hospital X in Kudus City

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## ABSTRACT

**Background:** There is a limit of using centralized AC in surgical rooms that requires hospital to control the growth of microorganism by using disinfectant A. Disinfectant A has been used for so long and has tested for its effectiveness, so hospital X held effectiveness test by comparing disinfectant A with other disinfectant. The aim was to analyze the effectiveness of disinfectant A and B to the growth of bacteria in Central Surgery Unit Hospital X Kudus City.

**Method:** The research was a quasi-experimental research with one group pre-test post-test. The number of samples was 36 samples. Data collection was conducted with laboratory observation. The data were then analyzed by Wilcoxon Test.

**Result:** Statistical result shows that there is no significant difference on the effectiveness of disinfectant A and B in surgical room ( $p > 0,05$ ) for both centralized and split AC. There are three identified bacteria in surgery room namely Staph. Aureus, Staph. Epidermidis dan Baccilus Sp. From the observation, the number of bacteria before using disinfectant A and B in rooms with split AC was Staph. Epidermidis 0,66 CFU/cm<sup>2</sup>, Staph. Aureus 0,67 CFU/cm<sup>2</sup> and Baccilus Sp 1,67 CFU/cm<sup>2</sup>, While in rooms with centralized AC, the observed number of bacteria can be seen as follows: Staph. Epidermidis 0,66 CFU/cm<sup>2</sup>, Staph. Aureus 0,33 CFU/cm<sup>2</sup> and Baccilus Sp 1,67 CFU/cm<sup>2</sup>. After 20<sup>th</sup> and 240<sup>th</sup> minute using disinfectant A and B, in rooms with centralized and split AC, there was no growth of bacteria (-).

**Conclusion:** The observation on the effectiveness of disinfectant A and B shows no growth of bacteria on the 20<sup>th</sup> and 240<sup>th</sup> minute which means that disinfectant B can be the alternative of disinfectant in surgery room.

**Keywords:** Disinfectant, number of bacteria, effectiveness, surgery room, AC

## INTRODUCTION

The operating room is the place where elective and acute surgical procedures are held, thus requiring sterile conditions and other special conditions. Based on the technical guidelines for hospital buildings, the operating

room is divided into several zones. This zoning system is intended to minimize the risk of spreading infection (infection control) by microorganisms from dirty areas of the hospital to the operating room. In addition, the operating room has special requirements for its building components such as floors, doors, walls, ventilation systems, lighting systems, electrical systems to minimize exposure to organisms in the operating room.<sup>1</sup>

The result of preliminary examination in Hospital X shows that the number of germs in labor and delivery room was 38 CFU/cm<sup>2</sup>, in ICU 112 CFU/cm<sup>2</sup>, and in operating room 12 CFU/cm<sup>2</sup>. The Regulation of the Minister of Health of the Republic of Indonesia Number

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1204/MENKES/SK/X/ 2004 established that a room is considered eligible for room floor and wall if the number of bacterial colonies in hospital is 0-5 CFU/cm<sup>2</sup> and in ward 5-10 CFU/ cm<sup>2</sup>. From examination result mentioned above, Hospital X has not met the required number as stated in the regulation.

During microorganism inspection in Hospital X, Kudus City, *Staphylococcus aureus*, *Bacillus subtilis*, *Staphylococcus epidermis*, and *E. Coli* were detected in ward and operating room. In several study, in some studies, these bacteria are the cause of nosocomial infections or act as the vector in the process of infection by certain microbes.<sup>2</sup>

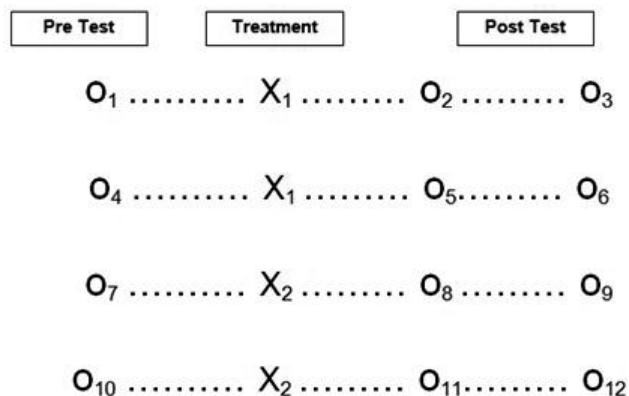
By default, operating room should be equipped with a ventilation system. The ventilation system filters or cleanses the air. Recirculation can be done through HEPA (*High Efficiency Particulate Air Filter*) Filter, before the air recirculates into the room at least six times per hour.<sup>1</sup> In Hospital X, HEPA Filter has not been used optimally in 24 hours due to the limited operation of central AC system in operating room to reduce maintenance and operational costs of electricity costs. Split AC system is used daily to maintain temperature and humidity of the operating room

Meanwhile, to maintain the sterile condition of the operating room from the growth of microorganisms, disinfectant A is used. Disinfectant, A which contains sodium hypochlorite, is easy to use and able to kill gram-positive bacteria and gram-negative bacteria.<sup>3</sup>

Besides that, disinfectant A has its disadvantages because the disinfectant is made from chlorine. Disinfectant A can cause corrosion and the disinfectant easily becomes inactive if exposed to certain organic compounds.<sup>3</sup> As disinfectant A has been used in the operation room for a long time and its effectiveness had not been tested, Hospital X needed to perform effectiveness test by looking for an alternative. Hospital X chose disinfectant B as the alternative as it contains similar materials to disinfectant A, quaternary ammonium derivative. Disinfectant B has several advantages, such as low toxicity, solubility in large water, stable in aqueous solution, colorless, and does not cause corrosion in metal tools.<sup>4</sup>

## METHOD

The research was a quantitative research using *quasi-experimental studies*. The research design *one group pre-test post-test design*.<sup>5</sup>



Gambar 3 2 Rancangan Penelitian

Where:

- O<sub>1</sub>: Testing for number of germs before the treatment using disinfectant A in rooms with central AC system
- X<sub>1</sub>: Treatment using disinfectant A
- O<sub>2</sub>: Testing for number of germs after the treatment using disinfectant A in rooms with central AC system in the twentieth minute
- O<sub>3</sub>: Testing for number of germs after the treatment using disinfectant A in rooms with central AC system in the 240<sup>th</sup> minute
- O<sub>4</sub>: Testing for number of germs before the treatment using disinfectant A in rooms with split AC system
- X<sub>1</sub>: Treatment using disinfectant A
- O<sub>5</sub>: Testing for number of germs after the treatment using disinfectant A in rooms with split AC system in the twentieth minute
- O<sub>6</sub>: Testing for number of germs after the treatment using disinfectant A in rooms with split AC system in the 240<sup>th</sup> minute
- O<sub>7</sub>: Testing for number of germs before the treatment using disinfectant B in rooms with central AC system
- X<sub>2</sub>: Treatment using disinfectant B
- O<sub>8</sub>: Testing for number of germs after the treatment using disinfectant B in rooms with central AC system in the twentieth minute

- O<sub>9</sub>: Testing for number of germs after the treatment using disinfectant B in rooms with central AC system in the 240<sup>th</sup> minute
- O<sub>10</sub>: Testing for number of germs before the treatment using disinfectant B in rooms with split AC system
- X<sub>2</sub>: Treatment using disinfectant B
- O<sub>11</sub>: Testing for number of germs after the treatment using disinfectant B in rooms with split AC system in the twentieth minute
- O<sub>12</sub>: Testing for number of germs after the treatment using disinfectant B in rooms with split AC system in the 240<sup>th</sup> minute

The study population was the floor of operating room. The operating room has an area of 5 x 5 m<sup>2</sup> so that the sample was chosen using quota sampling technique. Experimental replication was calculated by the following formula:<sup>6</sup>

$$(t - 1)(r - 1) > 15$$

The univariate and bivariate analysis were performed to analyze the result of the study. To see the difference in the effectiveness of disinfectants A and B on the growth of bacteria in Central Surgery Installation of Hospital X, Kudus City, Wilcoxon signed-rank Test was applied as data were not normally distributed. Shapiro–Wilk Test was then conducted to test for data normality.

## RESULTS AND DISCUSSIONS

Table 1 presents the result of bacterial identification in IBS operating room of Hospital X, Kudus City before using disinfectant A and disinfectant B.

**Table 1: Bacterial Identification in Operating Room of Hospital X, Kudus City**

Desinfektan A	Desinfektan B
Staphylococcus Aureus	Staphylococcus. Aureus
Staphylococcus Epidermidis	Staphylococcus Epidermidis
Bacillus Sp	Bacillus Sp

Bacterial identification shows that there are *Staphylococcus Aureus*, *Staphylococcus Epidermidis* and *Bacillus Sp*. in operation room of Hospital X, Kudus City before using any disinfectant. The finding is in line with previous microorganism examination that the floor of the operating room was contaminated with *Staphylococcus*

*aureus*, *Bacillus subtilis*, *Staphylococcus epidermis*, and *E. Coli*. Another study in Central Surgery Installation of Sanglah Hospital, Denpasar stated that there are various kinds of bacteria identified from isolation from bacteria contaminating the floor of the operating room. Those are negative-gram bacteria categorized in Enterobacteriaceae dan *Pseudomonas aeruginosa*.<sup>7</sup>

Bacteria found in hospital are various depending on the number of microorganism as well as their types in various air volume based on location, condition, pollutant, like human respiratory tract through coughing and sneezing. Air is a medium of spreading for microorganism. The most widely distributed microorganism in free air is bacteria, fungi (including yeast) and microalgae. Air is not the natural habitat for microorganism. The number of microorganism on air is relatively small if compared to microorganism found in water or in soil.

Air microorganism can be categorized into outdoor microorganism and indoor microorganism.<sup>8</sup> Besides that, the presence of bacteria is caused by various activities of surgery and a kind of “dirty” surgery that makes possible for bacteria causing any infections.<sup>9</sup>

*Staphylococcus* is common since the species is a flora on skin, respiration tract, and digestive tract so every person has the species on skin, nose, and throat.<sup>10</sup> Infection by *Staphylococcus epidermidis* is usually difficult to cure because some of the strains have become resistance to most antibiotics (multi-resistant). *Staphylococcus aureus* is circle gram-positive bacteria having 0,7-1,2 µm diameter. The bacteria grow in an optimum temperature of 37 °C, The bacteria develop their best pigment at room temperature (20-25 °C).<sup>11</sup> The average temperature of operating room is 22°C with 40-45% humidity. The condition is perfect for *Staphylococcus aureus* to grow.

*Bacillus Sp* is generally found in soil, water, air and plants. The bacteria grow on medium in the right state of temperature and water content on dusty and hard surfaces. *Bacillus Sp* is a rod-shaped bacteria, classified as gram-positive, motile, producing spores that are usually resistant to heat, aerobic (some species are facultative anaerobes), catalase positive, and has varied oxidation.<sup>11</sup>

There are several contributing factors to bacterial growth like temperature, humidity, and light. The more humid the air, the more likely the microbial content in

the air is because water particles can move the cells on the surface. Besides that the temperature affects the growth rate and the total amount of growth. If bacteria reach the optimum temperature, the condition allows the incubation of bacteria for a short period, which is between 12 and 24 hours.<sup>11</sup>

#### A. Examination Result of Bacteria for Disinfectant A

**Table 2: Examination Result of Bacterial Colonies before and after using Disinfectant A in Operating Room of Hospital X Kudus City using Split AC System**

Type of Bacterial	Number of Bacterial Colonies in Repetition			Mean
	1	2	3	
<b>Before</b>				
<i>Staph. Aureus</i>	7	6	8	7,00
<i>Staph. Epidermidis</i>	9	8	8	8,33
<i>Bacillus Sp</i>	2	4	6	4,00
<b>After 20<sup>th</sup> minute</b>				
<i>Staph. Aureus</i>	Negatif	Negatif	Negatif	-
<i>Staph. Epidermidis</i>	Negatif	Negatif	Negatif	-
<i>Bacillus Sp</i>	Negatif	Negatif	Negatif	-
<b>After 240<sup>th</sup> minute</b>				
<i>Staph. Aureus</i>	Negatif	Negatif	Negatif	-
<i>Staph. Epidermidis</i>	Negatif	Negatif	Negatif	-
<i>Bacillus Sp</i>	Negatif	Negatif	Negatif	-

Table 2 shows that the number of bacteria before using disinfectant A in operating room with Split AC system is *Staphylococcus Epidermidis* 8,33 CFU/cm<sup>2</sup> in average, *Staphylococcus Aureus* rata-rata 7,33 CFU/cm<sup>2</sup> in average, and *Bacillus Sp* rata-rata 4 CFU/cm<sup>2</sup> in average. After using disinfectant A, the examination in the 20<sup>th</sup> minute and 240<sup>th</sup> minute shows negative results for *Staphylococcus Aureus*, *Staphylococcus Epidermidis* and *Bacillus Sp*. It means that the bacterial examinations, which were, conducted in three repetitions shows no bacteria in the operating room.

The Regulation of the Minister of Health of the Republic of Indonesia Number 1204/MENKES/SK/X/ 2004 established that a room is considered eligible for room floor and wall if the number of bacterial colonies in hospital is 0-5 CFU/cm<sup>2</sup>. The examination result for disinfectant A shows that the operating room has met the requirement based on the criteria for operating rooms.

**Table 3: Examination Result of Bacterial Colonies before and after using Disinfectant A in Operating Room of Hospital X Kudus City using Central AC System**

Type of Bacterial	Number of Bacterial Colonies In Repetition			Mean
	1	2	3	
<b>Before</b>				
<i>Staph. Aureus</i>	4	3	2	3,00
<i>Staph. Epidermidis</i>	2	3	3	2,67
<i>Bacillus Sp</i>	1	2	1	1,33
<b>After 20<sup>th</sup> minute</b>				
<i>Staph. Aureus</i>	Negatif	Negatif	Negatif	-
<i>Staph. Epidermidis</i>	Negatif	Negatif	Negatif	-
<i>Bacillus Sp</i>	Negatif	Negatif	Negatif	-



Conted...

After 240 <sup>th</sup> minute				
Staph. Aureus	Negatif	Negatif	Negatif	-
Staph. Epidermidis	Negatif	Negatif	Negatif	-
Bacillus Sp	Negatif	Negatif	Negatif	-

The examination which were conducted in three repetitions before using disinfectant A in operating room with Central AC system resulted in the number of bacteria *Staphylococcus Epidermidis* is 2,67 CFU/cm<sup>2</sup> in average with standard deviation at 0,577. The number of *Staphylococcus Aureus* is 3,00 CFU/cm<sup>2</sup> in average with standard deviation at 1,000 and the number of *Bacillus Sp* is 1,33 CFU/cm<sup>2</sup> in average with standard deviation at 0,577.

The examination conducted at the 20<sup>th</sup> and 240<sup>th</sup> minute resulted in negative value for *Staphylococcus Aureus*, *Staphylococcus Epidermidis* and *Bacillus Sp*.

### B. Examination Result of Bacteria for Disinfectant B

**Table 4: Examination Result of Bacterial Colonies before and after using Disinfectant B in Operating Room of Hospital X Kudus City using Split AC System**

Type of Bacterial	Number of Bacterial Colonies In Repetition			Mean
	1	2	3	
<b>Before</b>				
Staph. Aureus	7	6	8	6,33
<i>Staph. Epidermidis</i>	9	8	8	7,33
<i>Bacillus Sp</i>	2	4	6	2,33
<b>After 20<sup>th</sup> minute</b>				
<i>Staph. Aureus</i>	Negatif	Negatif	Negatif	-
<i>Staph. Epidermidis</i>	Negatif	Negatif	Negatif	-
<i>Bacillus Sp</i>	Negatif	Negatif	Negatif	-
<b>After 240<sup>th</sup> minute</b>				
<i>Staph. Aureus</i>	Negatif	Negatif	Negatif	-
<i>Staph. Epidermidis</i>	Negatif	Negatif	Negatif	-
<i>Bacillus Sp</i>	Negatif	Negatif	Negatif	-

Table 4 presents the examination result of bacterial colonies before using Disinfectant B in Operating Room of Hospital X Kudus City using Split AC System. From the examinations that were conducted in three repetitions, the number of *Staphylococcus Aureus* is 6,33 CFU/cm<sup>2</sup> in average with standard deviation at 2,082, *Staphylococcus Epidermidis* 7,67 CFU/cm<sup>2</sup>, and *Bacillus Sp* 2,33 CFU/cm<sup>2</sup> in average with standard deviation at 0,577.

A room is considered eligible for operating room if the number of germs is 0-5 CFU/cm<sup>2</sup>. It means that the operating room examined is not eligible since the number of *Staphylococcus Aureus* and *Staphylococcus Epidermidis* in the operating room with Split AC system is higher than the requirement.

The examination conducted in the 20<sup>th</sup> and 240<sup>th</sup> minute shows negative results meaning that there were no bacterial growth of *Staphylococcus Aureus*, *Staphylococcus Epidermidis* and *Bacillus Sp* in the operation room.

**Table 5: Examination Result of Bacterial Colonies before and after using Disinfectant B in Operating Room of Hospital X Kudus City using Central AC System**

Type of Bacterial	Number of Bacterial Colonies in Repetition			Mean
	1	2	3	
<b>Before</b>				
Staph. Aureus	3	3	2	2,67
Staph. Epidermidis	3	3	4	3,33
Bacillus Sp	1	5	2	2,67
<b>After 20<sup>th</sup> minute</b>				
Staph. Aureus	Negatif	Negatif	Negatif	-
Staph. Epidermidis	Negatif	Negatif	Negatif	-
Bacillus Sp	Negatif	Negatif	Negatif	-

**Table 5: Examination Result of Bacterial Colonies before and after using Disinfectant B in Operating Room of Hospital X Kudus City using Central AC System (Con't)**

Type of Bacterial	Number of Bacterial Colonies in Repetition			Mean
	1	2	3	
<b>After 240<sup>th</sup> minute</b>				
Staph. Aureus	Negatif	Negatif	Negatif	-
Staph. Epidermidis	Negatif	Negatif	Negatif	-
Bacillus Sp	Negatif	Negatif	Negatif	-

The examination in operating room of Hospital X Kudus City using central AC system resulted in the number of *Staphylococcus Epidermidis* 2,67 CFU/cm<sup>2</sup> in average and *Staphylococcus Aureus* 3,33 CFU/cm<sup>2</sup> in average, while *Bacillus Sp* 2,67 CFU/cm<sup>2</sup> in average. The examination in the 20<sup>th</sup> and 240<sup>th</sup> minute resulted in negative results meaning that there was no bacterial growth for *Staphylococcus Aureus*, *Staphylococcus Epidermidis* and *Bacillus Sp* in operating room using central AC system.

### C. Analysis of the Effectiveness of Disinfectant A and B in Operating Room using Central AC System

**Table 6: Analysis of effectiveness of disinfectant A and B towards bacterial growth in operating room using central AC system**

Type of Bacterial	Type of Disinfectant				Total		P value
	A		B		n	%	
	n	%	n	%			
<b>Before</b>							
Staph. Aureus	3	33,3	3	33,3	6	33,3	0,317
Staph. Epidermidis	3	33,3	3	33,3	6	33,3	0,157
Bacillus Sp	3	33,3	3	33,3	6	33,3	0,180
<b>After 20<sup>th</sup> minute</b>							
Staph. Aureus	3	33,3	3	33,3	6	33,3	1,000
Staph. Epidermidis	3	33,3	3	33,3	6	33,3	1,000
Bacillus Sp	3	33,3	3	33,3	6	33,3	1,000

Conted...

After 240 <sup>th</sup> minute							
<i>Staph. Aureus</i>	3	33,3	3	33,3	6	33,3	1,000
<i>Staph. Epidermidis</i>	3	33,3	3	33,3	6	33,3	1,000
<i>Bacillus Sp</i>	3	33,3	3	33,3	6	33,3	1,000

The Regulation of the Minister of Health of the Republic of Indonesia Number 1204/MENKES/SK/X/ 2004 established that a room is considered eligible for room floor and wall if the number of bacterial colonies in hospital is 0-5 CFU/cm<sup>2</sup>. The number of bacteria before using disinfectant A in operating room with central AC system was, in average, *Staphylococcus Epidermidis* 2,67 CFU/cm<sup>2</sup>, *Staphylococcus Aureus* 3,00 CFU/cm<sup>2</sup> and *Bacillus Sp* 1,33 CFU/cm<sup>2</sup>. When using disinfectant B in operating room with central AC system, the number of bacteria was, in average, *Staphylococcus Epidermidis* 2,67 CFU/cm<sup>2</sup> *Staphylococcus Aureus* 3,33 CFU/cm<sup>2</sup> and *Bacillus Sp* 2,67 CFU/cm<sup>2</sup>. It means that the number of bacteria in operating room with central AC system has met the criteria based on the regulation of the Minister of Health of the Republic of Indonesia for the floor of operating rooms.

The results of bacterial examination before using disinfectant A and B in operating room with central AC system obtained *p value* > 0,05 which means that there was no significant difference between using disinfectant A and B in operating room with central AC system since the operating room is equipped with filtered and controlled air ventilation. Air ventilation and circulation provide fresh air and prevent accumulation of anesthetic gases. Central AC system is equipped with *high efficiency particulate filter* (HEPA Filter) while common AC is only equipped with air filter which eliminates dust particles.<sup>1</sup> HEPA filter controls and isolates contaminants in such a way to minimize their circulation time in operating zone.

Bacteria can grow in standing water where water spray was located and air was condensed. The environment offers warm and humid temperature for bacteria to breed. Condensation or the use of water spray supports bacterial growth and provides a moist environment. The organism enters the room through the air carried by the AC system.<sup>13</sup> Temperature affects the growth rate and the total amount of growth, changing certain metabolic processes and morphology (outer form)

of cells. The optimum growth temperature is the incubation temperature, which allows the fastest growth of bacteria in a short period of time, that is between 12 and 24 hours.<sup>11</sup>

Hospital X has used disinfectant A to sterilize its operation rooms from microorganism growth. Disinfectant A has been used based on standard operating procedure for sanitizing the operating room. Based on the standard operating procedure, the operating room has been disinfected in three methods, i.e. daily, one day off and one time disinfecting. The examination for bacterial growth in the 20<sup>th</sup> and 240<sup>th</sup> minute after using disinfectant A and B in operating room with central AC system resulted in negative result. The *p value* after using disinfectant A and B in operating room with central AC system was 1,000 (*p value* > 0,05), which means that there was no significant difference in using disinfectant A and B n operating room with central AC system.

In the standard operating procedures (SPO), disinfecting the operating room of Hospital X has conducted to prevent the occurrence of nosocomial infections. One time disinfecting and daily cleaning are more noticed. Daily cleaning is carried out every day, every time and after the surgery is carried out. This cleaning includes cleaning floors, instrument tables, operating lamps and desks, and the surface of the operating tools used in the operating room using disinfectants. Daily cleaning is conducted at the beginning of morning shift and after performing operation. The examination shows that there was no bacterial growth of *Staphylococcus Aureus*, *Staphylococcus Epidermidis* and *Bacillus Sp* after the cleaning, and the disinfectant is able to eliminate any bacterial growth in a 4-hour observation.

The presence of bacteria in the operating room is affected by the level of air pollution. The level of air pollution is influenced by several factors such as the rate of ventilation, the density of people in operating room and the level of activities of people occupying the room. Bacteria are exhaled in the form of sparks from the nose and mouth during

sneezing, coughing and even talking. The drops of water from the respiratory tract have a size that varies from micrometers to millimeters. Small water drops in size of micrometer will survive in the air for some time, but large sizes will soon fall to the floor and / or the surface of other objects. Dust from this surface will occasionally be in the air during the activity in the room.<sup>14</sup>

Commonly, the cause of nosocomial infections is autoinfection (endogenous, self-infection) from a bacterium that already exists in the human body and moves elsewhere in our body. The second cause is exogenous factor (cross infection) which is caused by the hospital environment, such as air in operating room and ward, non-sterile equipment, and hospital officers who lack of aseptic and antiseptic behavior.<sup>15</sup> Diseases caused by hospital environment are mostly caused by microorganism that commonly found in human and normally safe for normal people.<sup>16</sup>

Disinfectant A has sodium hypochlorite as its main ingredients. The ingredients is easy to use and eliminates gram-positive bacteria as well as gram-negative bacteria. Disinfectant A inhibits glucose oxidation in cells of microorganisms by inhibiting enzymes involved in carbohydrate metabolism<sup>3</sup> so that it is effective to eliminate *Staphylococcus Aureus* and *Staphylococcus Epidermidis* for 20 to 240 minutes after exposure to disinfectant. Because it is made from chlorine, disinfectant A can cause corrosion and is easily being inactive if exposed to certain organic compounds.<sup>3</sup>

Different from disinfectant A, disinfectant B at its optimal level contains quaternary ammonium compounds that cause lysis in cells. At higher levels, the compound ignites denaturation of bacterial enzyme proteins. Cell membranes are useful as a selective barrier to solutes and hold

insoluble substances. Some substances are actively transported through the membrane, so that their concentration in the cell is high. Substances that are concentrated on the cell surface will change their physical properties so that they eliminate and inhibit cell growth. The changes in membrane permeability of cells result in leakage of essential cell constituents which results in the death of cell.<sup>17</sup>

A study conducted by Erlina (2013) on the Effectiveness of Quaternary Ammonium 1% and Phenol 1% Disinfectant to Reduce the Number of Floor Germs in Ward of RSU Kardinah Tegal City suggests that Quaternary Ammonium 1% disinfectant is more effective compared to Phenol 1% disinfectant. Quaternary Ammonium disinfectant deactivates cell parts that produce enzyme, unfolds important protein cells and interferes cell membrane.<sup>17</sup> So, in this study, disinfectant B is not only effective to inhibit bacterial growth for *Staphylococcus Aureus*, and *Staphylococcus Epidermidis* for 20 – 240 minutes after exposure, but also destroys cell membranes, unfolds protein, and inhibit enzyme.

Quaternary ammonium is less toxic, highly soluble in water, stable in aqueous solution, colorless, and does not corrode metal tools. Quaternary ammonium derivatives such as benzalkonium chloride, benzetonium chloride, cetrimide, dequalinium chloride, and domifen bromide have bactericidal and bacteriostatic effects on gram-positive and gram-negative bacteria, fungi, and protozoa. However, this derivative is not active against spore-forming bacteria, such as *Mycobacterim tuberculosis* and viruses.<sup>2</sup> The disadvantage of disinfectant B are ineffective towards soap, anionic and non-ionic surfactant, Ca and Mg ions, blood serum, food, and complex organic substances.<sup>4</sup>

#### D. Analysis of Effectiveness of Disinfectant A and B in Operating Room using Split AC System

**Table 7: Analysis of effectiveness of disinfectant A and B towards bacterial growth in operating room using split AC system**

Type of Bacterial	Type of Disinfectant				Total		P value
	A		B		n	%	
	n	%	n	%			
<b>Before</b>							
<i>Staph. Aureus</i>	3	33,3	3	33,3	6	33,3	0,317
<i>Staph. Epidermidis</i>	3	33,3	3	33,3	6	33,3	0,157

Conted...

<i>Bacillus Sp</i>	3	33,3	3	33,3	6	33,3	0,180
<b>After 20<sup>th</sup> minute</b>							
<i>Staph. Aureus</i>	3	33,3	3	33,3	6	33,3	1,000
<i>Staph. Epidermidis</i>	3	33,3	3	33,3	6	33,3	1,000
<i>Bacillus Sp</i>	3	33,3	3	33,3	6	33,3	1,000
<b>After 240<sup>th</sup> minute</b>							
<i>Staph. Aureus</i>	3	33,3	3	33,3	6	33,3	1,000
<i>Staph. Epidermidis</i>	3	33,3	3	33,3	6	33,3	1,000
<i>Bacillus Sp</i>	3	33,3	3	33,3	6	33,3	1,000

Split air conditioner has indoor and outdoor parts. The compressor in Split AC system is located in the outdoor part and it has a fan to reduce the heat in the condenser pipe. The indoor part consists of evaporator pipe and electric motor to rotate the blower and then remove the condensed air to the designated room so that the room becomes cold.

The examination before using disinfectant A in operating room using split AC system shows the number of *Staphylococcus Epidermidis* 8,33 CFU/cm<sup>2</sup>, *Staphylococcus Aureus* 7,33 CFU/cm<sup>2</sup> and *Bacillus Sp* 4 CFU/cm<sup>2</sup>. While before using disinfectant B in operating room using split AC system, the number of *Staphylococcus Aureus* was 6,33 CFU/cm<sup>2</sup> in average, *Staphylococcus Epidermidis* 7,67 CFU/cm<sup>2</sup> and *Bacillus Sp* 2,33 CFU/cm<sup>2</sup>. In both observed room, the number of bacteria before using disinfectant A and B exceeded the required number of bacteria in operating room, which was established at 0-5 CFU/cm<sup>2</sup>.

The statistical test in operating room using split AC system before using disinfectant A and B resulted in *p value* > 0,05 meaning that there was no significant difference in bacterial examination before using disinfectant in operating room using split AC system. The condition was a result from insignificant temperature changes, which has no considerable changes to the number of germs. Russel stated that there are several physical and chemical factors contributing to the number of germs, namely temperature, acidity, and humidity.<sup>19</sup>

In addition, the number of bacteria in split AC bacteria is higher because the air filter filters only remove dust particles, while central AC is equipped with high efficiency particulate filter (HEPA Filter).<sup>1</sup>

After the use of disinfectant A and B in operating room using split AC system, the bacterial examination resulted in negative. It means that after the exposure to disinfectant,

in the 20<sup>th</sup> and 240<sup>th</sup> minute, there was no bacterial growth in operating room. The *value of p* was 1,000 (*p value* > 0,05), meaning that there was no significant difference in the effectiveness of using disinfectant A and B in operating room using split AC system.

In the use of disinfectants, disinfectant B is more efficient than disinfectant A. Five liters of disinfectant B can be used for 200 times dilution at 25 ml in 5 liters of water. While 100 tablets of disinfectant A which can only be used for 25 times dilution every 4 tablets in 5 liters of water. If the average frequency of surgery in hospital X is 32, and the room cleansing performed during post-surgery in addition to routine cleaning, disinfectant B can be used for more than 2 months.

## CONCLUSION

1. The result of inspection in operating room indicates that there are three kinds of bacteria, namely *Staphylococcus Aureus*, *Staphylococcus Epidermidis* and *Bacillus Sp*.
2. The result of analysis on effectiveness of disinfectant A and B on bacterial growth in the 20<sup>th</sup> and 240<sup>th</sup> minutes in operating room using central AC system shows that no bacterial growth was observed.
3. The result of analysis on effectiveness of disinfectant A and B on bacterial growth in the 20<sup>th</sup> and 240<sup>th</sup> minutes in operating room using split AC system shows that no bacterial growth was observed.

## ACKNOWLEDGMENT

I would like to extend my sincere gratitude to the advisor and examiners for the advice and encouragement and to my family, friends as well as the big family of the hospital for the support during the study.

**Conflict of Interest:** In this study data collection was carried out postoperatively without distinguishing the type of operation and sampling points taken at different quadrant points in each sample before disinfectant and after the exposure to disinfectant, in the 20<sup>th</sup> and 240<sup>th</sup> minute.

**Ethical Clearance:** Ethical clearance number 240/EC/FKM/ 2017 by the ethics committee on health research at Faculty Public Health, Diponegoro University.

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# Household Food Security and Food Diversity as Risk Factor for Stunting in Toddlers at 24-59 Months of Age

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## ABSTRACT

**Background:** The result of Riskesdas (2013) showed that the prevalence of stunting in Indonesia had increased from 35.6% to 37.2%. This high prevalence is not only related to health problems but also affected by others which indirectly affecting such as household food security. Low food security will result in a low quality of consumed food as reflected in a low food diversity which consumed by toddlers, leading to stunting. This study aims to analyze the risk factors for stunting in toddlers aged 24-59 months.

**Method:** This is an observational analytic study using a cross-sectional design. The study was carried out on Sub-district of Bayat, Klaten Regency, with a total of 100 toddlers aged 24-59 months as subjects using simple random sampling. The data then analyzed using bivariate analysis (Chi-Square, Fisher Exact test) and multivariate analysis (Logistic Regression test).

**Result:** Bivariate analysis showed that there was a relationship between birth length ( $p=0,050$ , OR=2,533, 95% CI: 1,084-5,919), household food security ( $p = 0,00$ , OR = 6,160, 95% CI: 2,497-15,197), food diversity ( $p = 0.00$ , OR = 6.801, 95% CI: 2,146-21,558) with the occurrences of stunting. The result of multivariate analysis showed that there was a relationship between household food security ( $p = 0,00$ , OR = 8,328, 95% CI: 2,860-24,251) and food diversity with the occurrences of *stunting* in toddlers ( $p = 0,01$ , OR = 10,092, 95% CI: 2,558-39,815).

**Conclusion:** The household food security and food diversity are the risk factors for stunting in toddlers aged 24-59 months.

**Keywords:** Food Security, Food Diversity, Stunting

## INTRODUCTION

Stunting is a problem of nutrition in the world. There are 165 million toddlers worldwide who were short (stunting). Eighty percent of stunted children are spread across 14 countries in the world and Indonesia is ranked fifth in term of number.<sup>1</sup> In Southeast Asia, only Laos (44%), Cambodia (41%), and Timor-Leste (58%) have a higher stunting prevalence compared to

Indonesia.<sup>2</sup> The prevalence of stunting in Indonesia increased from 35.6% (in 2010) to 37.2% (in 2013). This demonstrates that approximately 8.9 million Indonesian children experience suboptimal growth or one in three children are stunted.<sup>3</sup>

The results of Nutrition Status Monitoring (PSG) Indonesia in 2017 showed that the prevalence of stunting among toddlers aged 24 - 59 months (29.6%) was higher than aged 0-23 months (20.1%).<sup>4</sup> This high prevalence is not only related to health problems but also affected by others which indirectly affecting such as household food security.

According to FAO (2003), household food security is a condition in which the households have physical, social, and economic access to the safe and nutritious food sufficient enough to meet the nutritional needs so that an

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active, healthy life could occur.<sup>5</sup> The risk for stunting is increased in infants with household food insecurity.<sup>6,7</sup>

The results of the study conducted in Indonesia showed that the household food security may be used as a predictor of the occurrence of stunting in infants and obesity/overweight in mothers.<sup>8</sup>

The food intake in household food insecurity is not diverse in which affect the quality of food for toddlers. Non-diverse foods are associated with increased risk of stunting and other nutritional problems such as cardiovascular, dyslipidemia, metabolic syndrome<sup>9-11</sup>. The results of the study in Kenya also showed that there was a significant relationship between food diversity and stunting, the less various food consumed by toddlers, the greater the risk of being stunted.<sup>12</sup>

Klaten regency is one of the regencies that included as 100 cities/regencies with stunting priority.<sup>13</sup> Klaten Regency consists of 26 districts and Bayat is one of the sub-districts that have a high stunting prevalence of 21.07%. Based on this, the aim of this study is to analyze the risk factors for stunting in toddlers aged 24-59 months.

## METHOD

This is an observational analytic study using a cross-sectional design. This study was carried out in Sub-district of Bayat, Klaten Regency in April 2018. The study site was purposively chosen by considering that Sub-district of Bayat had a high prevalence for stunting. Three villages with a high prevalence of stunting (Wiro, Banyuripan, and Jarum) were chosen. The population in this study were all toddlers aged 24 - 59 months. The sample size was calculated by using Slovin calculation formula. Total 100 children were obtained as the study subjects.

The sampling method used was simple random sampling. The toddlers who fulfill the inclusion criteria were selected and then randomized. The inclusion criteria were the child must not in medical care at the time of the study, living with its own parents, living in Sub-district of Bayat, toddlers aged between 24-59 months, and having books of KIA (*Kesehatan Ibu dan Anak/Maternal and Child Health*) and KMS (*Kartu Menuju Sehat/Health Improving Card*).

The primary and secondary data were collected. Primary data were obtained from interviews and direct measurements using questionnaires such as household income, mother education, household food security, food diversity, and height measurement data. Secondary data were collected from the literature study and data of toddlers in the primary health center and community clinic as well as birth weight and birth length data as seen from KIA and KMS book. Height measurement was performed using Microtoise with 0.1 cm of precision. The data were collected by the author and assisted by two people from DIII (associate degree) of nutrition and one bachelor of nutrition. Before the research is conducted, initial training was performed to reduce the level of measurement error.

Dependent variable in this study is nutritional status based on height for age. The nutritional status divided into two categories: normal if Height/Age z-score  $> -2.0$  SD and stunting if Height/Age z-score  $< -2$  SD.<sup>14</sup> Independent variables were household income, mother education, gender, birth weight, birth length, household food security, and food diversity. Household income was obtained from the total expenditure for 1 month divided by the number of family members then classified as poor or not poor. The poverty line for Klaten Regency is Rp. 376.305/capita/month.<sup>15</sup> Maternal education was divided into two: low (equal to or lower than middle-high school) and high (equal to or higher than high school). Birth weight was categorized into two: low birth weight if  $< 2500$  grams and normal if  $\geq 2.500$  gram. Birth length was grouped into two: low birth weight if  $< 48$  cm and normal if  $\geq 48$  cm.

Household food security was measured using the Household Adequacy Level of Energy. The adequacy level of energy has long been used as a gold standard to detect food insecurity. The energy consumption level of less than 70% implies the occurrence of food insecurity.<sup>16</sup> The household adequacy of energy was measured using the household 24-hour recall method. The food diversity was measured using the recall method for 2 x 24 hours, after which the data were entered on the DDS/Dietary Diversity Score questionnaire.<sup>17</sup> A score of 0-5 was categorized as non-diverse, and the score of 5 or more was considered as diverse.<sup>18</sup>

Descriptive analysis was performed through the categorization of data to describe the distribution of variables by percentage. Bivariate analysis was used to determine the relationship between dependent variable and independent variable. In this study, the bivariate



analysis used was the chi-square test and the Fisher Exact test with a confidence interval of 95%. The logistic regression test was used for the multivariate analysis. It was used to explore the direction of the relationship and the Odd Ratio (OR). The result of the chi-square test and Fisher Exact test between the dependent and independent variable with  $p < 0.25$  were included in the logistic regression test.

## RESULTS AND DISCUSSIONS

### RESULTS

There were a total of 100 toddlers aged 24-59 months in this study. Based on table 1, it can be seen that fifty-seven percent of the subjects were male and 43% were female. Most subjects (86%) had birth weight  $\geq 2500$  grams and only 14% of subjects had birth weight  $< 2500$  grams. As many as 66% of subjects have a birth length of  $\geq 48$  cm and 34% of  $< 48$  cm. Regarding the household income, 70% of the subjects came from wealthy families and 30% of subjects from poor families. Based on mother education, 54% of subjects have mothers with low education level. Sixty-five percent of the subjects came from secure household food and 35% came from insecure household food. Dietary Diversity Score (DDS) showed that 71% of subjects have non-diverse food intake and only 29% are diverse. Forty-one percent of subjects developed stunting while 59% of them had normal nutritional status.

**Bivariate Analysis:** Bivariate analysis is used to test whether there is a relationship between the 2 variables; independent and dependent variable. The analysis used in this study was Chi-Square and Fisher Exact test. Based on table 2, it can be seen that the percentage of stunted male toddlers is higher compared to female toddlers. Chi-square test showed that there was no relationship between gender and stunting occurrences. Percentage of stunted toddlers with birth weight  $< 2500$  g and birth length  $< 48$  cm were 64.3% and 55.9%, respectively. The result of the chi-square test showed that there was a correlation between body length and stunting ( $p = 0.05$ ). In this study, stunting was not associated with birth weight.

**Table 1: Characteristics of Toddlers**

Characteristic of Toddlers	Frequency	Percentage (%)
<b>Gender</b>		
Male	57	57
Female	43	43

Conted...

<b>Birth Weight</b>		
$< 2500$ gram	14	14
$\geq 2500$ gram	86	86
<b>Birth Length</b>		
$< 48$ cm	34	34
$\geq 48$ cm	66	66
<b>Household Income</b>		
Poor	30	30
Not Poor	70	70
<b>Mother Education</b>		
Low	54	54
High	46	46
<b>Household Food Security</b>		
Insecure	35	35
Secure	65	65
<b>Food Diverse</b>		
Non-diverse	71	71
Diverse	29	29
<b>Nutritional status</b>		
Normal	59	59
stunting	41	41

Regarding the household income, in this study, 50% of stunted toddlers came from poor households. Fifty percent of stunted toddlers have low educated mothers. The result of statistical test showed that there was no correlation between household income with stunting incidences in toddlers. Mother education was correlation with stunting ( $p = 0.075$ ).

Stunted toddlers in this study mostly came from insecure household food (68.6%) and 52.1% of them had a non-diverse intake. The results of the statistical tests showed that there was a relationship between household food security and food diversity with stunting occurrences in toddlers ( $p = 0.00$ ).

**Multivariate Analysis:** From the results of chi-square and Fisher Exact test, the variables that can be included in logistic regression analysis ( $p < 0.25$ ) were birth weight, birth length, maternal education, household food security, and food diversity, while other variables removed from the logistic regression test. The result of logistic regression analysis showed that household food security and food diversity were significantly associated with stunting development with each OR was 8,328 and 10,092 with the direction of the relationship were proportional and become the risk factor for the development of stunting (Table 3).

**Table 2: The Relationship between the Characteristics of the Toddlers with Stunting**

Characteristic of Toddlers	Stunting		Normal		p value	OR(CI95%)
	n	%	n	%		
<b>Gender</b>						
Male	24	42,1	33	57,9	0,957	1,112 (0,497-2,491)
Female	17	39,5	26	60,5		
<b>Birth Weight</b>						
< 2500 gram	9	64,3	5	35,7	0,106	3,038 (0,936-9,860)
≥ 2500 gram	32	37,2	54	62,8		
<b>Birth Length</b>						
< 48 cm	19	55,9	15	44,1	0,050*	2,533 (1,084-5,919)
≥ 48 cm	22	33,3	44	66,7		
<b>Household Income</b>						
Poor	15	50	15	50	0,329	1,692 (0,713-4,017)
Not poor	26	37,1	44	62,9		
<b>Mother Education</b>						
Low	27	50	27	50	0,075*	2,286 (1,003-5,211)
High	14	30,4	32	69,6		
<b>Household Food Security</b>						
Insecure	24	68,6	11	31,4	0,000**	6,160 (2,497-15,197)
Secure	17	26,2	48	73,8		
<b>Food Diversity</b>						
Non-diverse	37	52,1	34	47,9	0,000**	6,801 (2,146-21,558)
Diverse	4	13,8	25	86,2		

\*p value = < 0,10 dan \*\* p value = < 0,05

**Table 3: The Result of Logistic Regression Test of the Risk Factor in Toddlers Aged 24-59 Months**

Variable	B	P	OR	Confidence Interval	
				Lower	Upper
Mother Education	0,868	0,089*	2,382	0,876	6,478
Household Food Security	2,120	0,000**	8,328	2,860	24,251
Food Diversity	2,312	0,001**	10,092	2,558	39,816
Constant	-1,858	0,001	0,156		

**Note:** Due to OR changes of more than 10%, the birth weight and the birth length were removed from the final model of logistic regression test using Backward Wald method

## DISCUSSIONS

**The Relationship between The Characteristic of the Toddlers and The Occurrences of Stunting:** The results of this study indicate that the 41% of toddlers aged 24-59 months are stunted. According to WHO, a region is considered as suffering from malnutrition if

the prevalence of stunted toddlers is more than 20%.<sup>19</sup> The high prevalence of stunting should be immediately addressed as it leads to decreased cognitive function, memory impairment, and poor academic performance, and would decrease their income and work productivity as an adult. All of this ultimately increase the poverty rate in Indonesia.<sup>20</sup>

Percentage of stunted male toddler aged 24-59 months with the female toddler did not differ with 42.1% and 39.5%, respectively. The statistical results showed that there was no relationship between gender with stunting occurrences. The statistical results showed that there was no relationship between gender with stunting occurrences. Although there was no relationship between the gender and the occurrences of stunting, there was a greater tendency to male in term of the risk of stunting. The results of the study conducted in Maluku and Central Africa showed that male toddlers had a greater risk of stunting compared to female.<sup>21,22</sup> Male toddlers had a 1.7 times greater risk for stunting when compared with female toddlers.<sup>22</sup> Similar finding was also demonstrated by Aryastami et al., that male toddlers have 1.28 times greater risk for stunting, compared to female.<sup>23</sup>

Eating behavior and maternal habit during pregnancy will affect the birth weight and birth length. Mothers who have a poor diet will give birth to babies with low birth weight and length. From this study, 64.3% of stunted children had birth weight < 2500 gram. This is greater when compared with the stunted subject who have birth weight  $\geq$  2500 grams. The statistical results showed that there was no correlation between birth weight and stunting development in infants. Birth weight was not a risk factor for stunting in toddlers. This could be attributed to the effect of birth length occurred in the first 6 months of life, then gradually decreases until the age of 24 months. Thus if the baby could pursue their growth in the first 6-months of life, there is a high probability of achieving normal height.<sup>24</sup>

Regarding the birth length, 55.9% of the stunted have a birth length < 48 cm and while 33.3% of them have a birth length of  $\geq$  48 cm. The results of this study indicated that there was a relationship between the birth length with the development of stunting ( $p \leq 0,05$ ). Toddlers born with < 48 cm body length have 2,533 times risk to develop stunting. Similar finding was also demonstrated by Trimukti et al., that toddlers born with < 48 cm body length have 1.28 times risk for stunting.<sup>25</sup>

Socio-economic conditions such as household income and maternal education are indirect factors causing stunting in infants. The results of this study implicated that there was no relationship between household income with stunting development in infants. This could be explained due to national programs such

as PKH, BLT, raskin, and other similar programs that could increase the food security for the children's need. The results of prior studies demonstrated that children from poor households had 2.14 times greater risk of stunting, compared to children from wealthier families.<sup>25</sup> In poor households, the provision of food intake was less nutritious, so that the children were more prone to growth failure, infectious diseases, and lack of access to health services.<sup>26,27</sup>

The level of maternal education is one important factor that closely related to the level of knowledge and awareness of health and nutrition of the toddlers. The higher the level of education, the better the knowledge of nutrition and mother who has good knowledge of nutrition will know how to process the food, how to arrange food menu, so that the nutrition will be more assured.<sup>28</sup> The result of this study indicated that there was relationship between maternal education level with the stunting development ( $p=0,075$ ). A study conducted in Nairobi showed that there was a relationship between the level of maternal education with the occurrence of stunting. Short toddlers were 29% higher in mothers with a lower level of education.<sup>28</sup> According to Emamian et al., (2013) maternal education improvement is one effort among others to reduce the occurrence of stunting.<sup>29</sup>

Stunting development in toddlers is not only influenced by health-related factors but also influenced by household food security. In this study, the percentage of toddlers who suffered stunting in insecure and secure household food differs significantly by 68.6% and 26.6%, respectively. The chi-square test showed that there was a relationship between household food security and stunting development in infants ( $p=0,00$ ). The toddlers who come from insecure household foods have a greater risk of stunting if compared to secure household foods. In terms of diversity, the results of the chi-square test showed that there was a relationship between food diversity and the occurrence of stunting ( $p = 0.0$ ). The more diverse the food intake, the smaller the risk for stunting. Toddlers in this study had a low intake of vegetables, fruit, meat, and fish. The previous study conducted by Mahmudiono et al., (2017) showed that stunted toddlers who had a low intake of animal protein sources had a greater chance of stunting due to the lack of iron and zinc from animal protein sources which prevent the stunting in toddlers.<sup>30</sup>

**The Risk Factor for The Development of Stunting:**

Multivariate test results using logistic regression showed that household food security and food diversity were the most dominant risk factor of stunting development. Toddlers from insecure household food are at an 8.328 times greater risk of stunting compared to toddlers from secure household food ( $p = 0.00$ ,  $OR = 8,328$ ,  $95\% CI: 2,860-24,251$ ). The results of this study are similar to which conducted by Mutisya et al., (2015) that the risk of stunting is increased by 12% in toddlers from household food insecurity.<sup>6</sup> A household with food security has better quantity and quality of the food and this will affect the nutritional needs of the toddlers in which the optimal nutrition is achieved. Toddlers who come from households with food security have good adequacy level of energy, unlike toddlers from food insecurity who have growth retardation due to lackness of food access, so that food serving is reduced to share with other family members.<sup>31</sup>

Toddlers are considered to have less food access if the quality and quantity of the daily menu composition is incomplete as well as the dominant veggies as the side dish. The composition which is not nutritious, unbalanced, and not diverse in both quality and quantity could cause a delay in growth and malnutrition in toddlers.<sup>32</sup> Food diversity is one of the most dominant risk factors for stunting. Toddlers with non-diverse food intake had 10.092 times to experience stunting when compared with toddlers with various dietary intake ( $p = 0.01$ ,  $OR = 10.092$ ,  $95\% CI: 2.558-39,815$ ). The results of this study are similar to the study that the nutritional status of children aged 12-36 months was positively related to the diversity of dietary intake, and there is a difference of Z-score of 1.6 between the children who consumed one type of food compared to the children who consumed eight types of food for seven days.<sup>17</sup>

The results of this study are in accordance with the study conducted in Kenya which shown that the food diversity and food security may be used as proxy measures for stunting.<sup>12</sup> The study conducted in Bangladesh, Nepal, Pakistan, Tanzania, and Uganda showed that the household food security was related to the nutritional status of the child. The household food security and DDS (Dietary Diversity Score) may be used as the proxy measures for the underlying nutritional status of children.<sup>33</sup>

**CONCLUSIONS**

From the above discussion, it could be concluded that household food security and food diversity are the most dominant risk factor of stunting development. Toddlers who come from insecure household food have an 8.328 times greater risk to develop stunting when compared with toddlers from secure household food. Regarding the food diversity, toddlers who have non-diverse food intake has 10.092 times to develop stunting when compared with a diverse dietary intake. Based on these, it could be seen that the incidence of stunting in toddlers is not only influenced by health-related factors but also influenced by other non-health-related such as household food security. Therefore, there is a need for inter-sectoral cooperation from the different government institution to prevent the occurrence of stunting.

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# The Influence of Giving Information and Its Factors Affecting the Knowledge Level of Antibiotics Use in Temanggung Regency

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## ABSTRACT

The incidence of antibiotic resistance was allegedly due to low public knowledge. This study aims to determine the influence of giving information and its factors affecting the knowledge level of antibiotics use in Kertosari village Temanggung Regency. This Experimental research was carried out by the design One group pretest-posttest. The instruments for the research were questionnaire and leaflet adjusted to the guidance of pharmaceutical service for antibiotic therapy by the Indonesian Ministry of Health. Data analysis used was Paired T-Test with the level credibility of 95%. The results based on the analysis Paired T-Test showed that before getting an education, the respondents had moderate knowledge (66.20%) and after having up to 19.06%. Therefore, they had good knowledge (85.26%) with the sig value ( $p < 0.05$ ) it means there was a significant achievement of important knowledge after education was carried out. Based on the Chi-Square analysis, respondent's characteristics that influenced the improvement of respondents' knowledge was only the age and job ( $p < 0.05$ ). It means there was a significant relationship between age and job of respondents with the improvements of knowledge they had. The provision of drug information has an effect on the increasing knowledge of antibiotic use where age and job are the most influential factors.

**Keywords:** drug information, knowledge, drug use, antibiotic

## INTRODUCTION

An antibiotic is a drug that helps to inhibit or kill the bacteria causes infection in humans. The use of antibiotics during the last decade also experienced a significant increase in all countries in the world, including Indonesia. The use of antibiotics for this felt very profitable when with the right and prescribing its precise because it can create an enormous effect conferring therapy<sup>[1-4]</sup>. The use of the antibiotic began uncontrolled and became irrational from year to year<sup>[5]</sup>. Consequences that will occur and the unavoidable use of

an antibiotic that is irrational is the incidence of resistant microorganisms<sup>[6]</sup>. The problem occurs when the bacteria resistance to change into one or another of the things that cause a loss of effectiveness down or drugs, chemical compounds or other ingredients that are used to prevent or treat the infection.

In a study conducted by Togoobaatar et. Al (2010) shows that in the Americas, Asia and Europe there are 22% up to 70% of the community who misunderstand the use of the correct antibiotic and often taking antibiotics without a doctor's prescription<sup>[7]</sup>. The results of the research of Antimicrobial Resistant in Indonesia (AMRIN-Study) in 2000-2005 at 2494 individuals in the community, shows that 43% of Escherichia coli resistant to many types of antibiotics, among others: ampicillin (34%), cotrimoxazole (29%) and chloramphenicol (25%)<sup>[8]</sup>. The behavior of the improper use of antibiotics by most of the society Indonesia, i.e., as a rule, don't spend appropriate antibiotics, excessive use of antibiotics, the use of antibiotics that are not needed and buy antibiotics without the use of prescription from a doctor<sup>[9-13]</sup>.

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This research was conducted in Kertosari village, Temanggung, Central Java with the purpose to find out the knowledge society on the use of antibiotics. Also, to find out whether there are differences between the characteristics of the respondents against the increase in knowledge.

## METHOD

This research was obtaining the certificate of Ethical Clearance of Provincial Hospital Dr. Moewardi – Faculty of Medicine Universitas Sebelas Market and get licenses to research in the region of Temanggung. The research design used one group pretest-posttest using questionnaires. Sampling nonprobability with the purposive sampling on society in Kertosari Village and had 104 respondents. This research uses a questionnaire that has been adapted to guide the use of the antibiotic therapy of Department of Health Republic of Indonesia 2011 and tested the validity and reliability. This questionnaire contains 20 numbers that are divided into several points of discussion that is the meaning of antibiotic, usage instructions, resistant factors, undesirable effects and the way to save drugs. The data obtained processed using Statistical Paired T-Test and Chi-Square analysis to know the characteristics of respondents that influence the increase of knowledge that is presented in the form of graphs and tables.

The questionnaire amounted to 20 items first tested the validity and the reliability. From the test results, it is known that the 20 items tested as valid and reliable. The questionnaire used was already adapted to guide the use of antibiotic therapy. Reliability test showed the value of *Cronbach alpha* of 0.931. These results indicate that the questions contained in the questionnaire assessed reliably as a tool to measure knowledge in the research.

## RESULTS

Respondents used in this research as much as 104 respondents. The respondents represent some areas in the Temanggung Regency. Distribution of respondents

can be seen in table 1. Respondents were given the same treatment be given advance knowledge is measured with a given matter of pretest and then provided information about antibiotic, and after it was measured again with knowledge of given question posttest.

**Table 1: Characteristics of Respondents**

Variables	Characteristic	n	%
Age (years)	26-35	10	9.62
	36-45	27	25.96
	46-55	45	43.27
	56-65	22	21.15
Education	Primary	17	16.3
	Middle School	14	13.5
	High School	51	49
	Colege	22	21.2
Employment	Civil servant	18	17.3
	Self Employed	32	30.8
	Unemployed/ housewife	54	51.9

The first test was done using the Kolmogorov Smirnov normality to know the spread of the data obtained are normal or not, and the results of the normality of data obtained  $p=0.116$  on pretest and  $p=0.108$  on the posttest, then inconclusive data is normally distributed ( $p > 0.05$ ).

The results of a pretest and posttest were tested with paired T-Test and the average value of the obtained answers of respondents who correctly before the extension was 66.20%, while the average value of the respondent's right after the extension was 85.26% with experience increased knowledge of 19.06%. The sign value obtained of  $p = 0.00 (< 0.005)$ . This it can be concluded that there is a meaningful difference in knowledge about the correct use of antibiotics before and after illumination. This level of knowledge difference can be interpreted as the results of the through media outreach leaflets and continued the discussion as well as the faqs to get optimal results. The results of increased the knowledge of the respondents can be seen in table 2.

**Table 2: Measurement of Increased the Knowledge of the Respondents**

Question	Percentage of correct answers (%)		Percentage of The Increase in Knowledge (%)
	Pretest	Posttest	
Knowledge of antibiotics	15.07	15.99	0.93
Instructions for drug use	11.89	17.89	6.01



Conted...

Resistance Factors	13.32	15.73	2.41
Side effects	12.75	16.13	3.38
How to store medicines	13.17	19.50	6.34
Percent of total knowledge	66.2	85.26	19.06

The characteristics of the respondents are divided into several groups, age, education, and work. The results of the relationship between each of the characteristics of respondents and knowledge can be seen in table 3. The knowledge here is divided into three groups, well, enough and weak. The test used a Chi-Square test with IE results P Value below 0.05 it is said there is a meaningful difference between the characteristics of the respondents against his knowledge after the giving of the information.

**Table 3: Correlation Between Knowledge and Characteristic Respondent**

Variables		Percentage of the knowledge level						P Value
		Good		Moderate		Low		
		n	%	n	%	n	%	
Age (years)	26-35	3	2.88	7	6.73	0	0	0.00
	36-45	23	22.11	4	3.85	0	0	
	46-55	37	35.58	8	7.69	0	0	
	56-65	10	9.62	12	11.54	0	0	
Education	Primary	10	9.61	6	5.77	0	0	0.61
	Middle School	11	10.58	4	3.85	0	0	
	High School	32	30.77	19	18.27	0	0	
	Colege	20	19.23	2	1.92	0	0	
Employment	Civil servant	17	16.35	1	0.96	0	0	0.47
	Self Employed	21	20.19	11	10.58	0	0	
	Unemployed/housewife	35	33.65	19	18.27	0	0	

## DISCUSSION

The results of this study reveal that some people misunderstand the use of antibiotics<sup>[14-16]</sup>. This can be seen from the percentage of correct answers in filling out the questionnaire before being given information related to the correct use of antibiotics. After the given information can be seen increased knowledge of respondents by 19.06%.

Some of the people in our survey knew some important points regarding antibiotic use. Almost all of the people know what antibiotics are. The correct use of antibiotics is known only about one-third of the population, as well as the way to keep a good and proper medicine. Therefore, after being given the percentage information, the correct answer increased quite high around 6%. According to studies that once people have been wrong in using antibiotics because they use them

for some diseases that have the same symptoms as previous diseases<sup>[17]</sup>.

The characteristics of respondents are grouped into age, education, and occupation of respondents. Age is one of the factors that influence one's knowledge. Age can affect the thinking, capture, and memory of a person. In the age before 55 years, a person is assumed to have the ability to capture and remember higher information along with age. The age of more than 55 years has started organ degeneration so that the ability of memory and its catch is decreasing. The previously studied mentioned that the age of respondents significantly influences the increase of knowledge<sup>[18]</sup>.

Education is also a factor that affects one's knowledge. A person's mindset and understanding of information are influenced by his education. Higher education is expected to get more and more information,

and better understand and process information better. These results are in line with the theory, the average knowledge of respondents in the category of least enough of the college end-educated. These results were not statistically proven after being tested using chi-square and obtained p-value of 0.061 ( $> 0.05$ ). Several studies that are in the line include the Djuang study which states that there is no correlation between the level of education with the use of antibiotics<sup>[19]</sup>. Other studies are from Trepka et al. (1998) where low levels of education affect the concept of antibiotic use<sup>[20]</sup>.

A person's employment can also affect one's knowledge. The environment around a person's workplace can affect his or her social life. Environmental factors of work can affect the amount of exposure of information received by a person. Respondents who work generally interact with their colleagues. The process undertaken during work can affect a person's mindset. Therefore this is by the results obtained where their work affects their knowledge in using antibiotics.

## CONCLUSION

The results showed that there was a difference in the level of knowledge after the giving of the information with an increase in the average value of pretest and posttest conducted of 19.06% ( $p < 0.05$ ). Based on statistical analysis, respondent's characteristics that influenced the improvement of respondents' knowledge was only the age and job ( $p < 0.05$ ). It means there was a significant relationship between age and job of respondents with the improvements of knowledge they had.

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**Conflict of Interest:** This paper has been approved by all author and there was no conflict of interest

**Ethical Clearance:** The study was approved by the ethics committee of Faculty Medicine of Sebelas Maret University with ethical certificate number: 501 / IV / HREC / 2018.

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# **Persuasive Communication in Morning Dialogues Performed by Hospital Health Promotion Officers with Degenerative Diseases Prevention Knowledge (The Case Study at the Patient Checkup in Sultan Agung Islamic Hospital)**

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## **ABSTRACT**

Persuasive communication, performed by the Health Promotion Officers of Sultan Agung Islamic Hospital Semarang in morning dialogues, aims to change or influence one's beliefs, behavior, and knowledge; therefore, he or she acts according to the communicator's hopes. The morning dialogue materials; furthermore, are about degenerative diseases prevention. This research's purpose is to describe how persuasive communication in morning dialogues performed by the hospital health promotion officers can support changes in patients' knowledge of degenerative diseases prevention. This research is a descriptive-analytical research with cross sectional study design. The research samples, collected from random sampling, were 96 patients conducting checkup after hospitalized in Sultan Agung Islamic Hospital. The Chi-Square test with alpha 0.05 was employed, and the result showed variables correlated to the knowledge of degenerative diseases prevention such as sex ( $P=0.005$ ), education ( $P=0.025$ ), credibility of the hospitals health promotion officers (0.018), message packaging in persuasive communication (0.022), time spent for listening morning dialogues ( $P=0.025$ ), and choosing morning time to conduct dialogues (0.018). Meanwhile, the uncorrelated variables are age ( $P=0.629$ ) and occupation (0.778). The persuasive communication helps the hospital health promotion officers to educate patients who conduct checkup to have healthy life knowledge.

**Keywords:** *persuasive communication; hospital's health promotion; checkup patients; degenerative diseases.*

## **INTRODUCTION**

Health promotion is one of important efforts in National Health System (abbreviated as SKN in Indonesian language). In the systems both established in 2004 and reestablished in 2009, it is mentioned that one of the subsystems is the Society Empowerment Subsystem.<sup>1</sup> This subsystem is an arrangement that collect all efforts in health issues done by individuals, groups, and societies cohesively and collectively in order to achieve the maximum degree of healthy life. The purpose of this subsystem is to ensure that service, advocacy, and social monitoring related to health issues can be implemented effectively and efficiently by individuals, groups, and societies for supporting health development.<sup>1</sup>

Persuasive communication can be understood as a message conveying process from the communicator to the communicant for the purpose of ensuring

the communicant to do or behave according to the communicator's expectation. Persuasive communication as an effort to promote health is implemented in morning dialogues performed by the officers of Hospital Health Promotion (PKRS in Indonesian).<sup>2</sup> Hospital Health Promotion is activities closely related to all efforts to improve health. These activities aim to change the opinion of individuals or groups, so they can have healthier life<sup>2</sup>

The health promotion employed in Sultan Agung Islamic Hospital is in persuasive communication packaging, and the kinds of activities are direct counseling both inside hospital and outside hospital.<sup>5</sup> Morning dialogue program is the message packaging, conducted by the hospital health promotion officers, who gives information about prevention of degenerative diseases. Therefore, this program is the mediator between the hospital and the society in order to give education and

counseling about the importance of preventive measures for a disease outbreak.

Therefore, the formulation of this research is: "How persuasive communication in morning dialogues, performed by hospital health promotion officers, can support changes in patients' knowledge of the degenerative diseases prevention."

## RESEARCH METHODOLOGY

**The type and design of the research:** This research was a quantitative research with interview method and cross sectional approach.

**The research subjects:** The research subjects were the patients doing checkup in Sultan Agung Islamic Hospital. These subjects were collected using the random sampling technique in which 96 respondents were obtained.

## RESULTS AND DISCUSSIONS

The result of the Chi-Square test with alpha 0.05 has described several variables in connection with the knowledge of degenerative diseases prevention. There are six variables that are correlated with the knowledge, and there are two variables which are not correlated.

### Ages and Knowledge of Degenerative Diseases Prevention

**Table 1: Cross table describing ages and knowledge of degenerative diseases prevention**

Ages	Degenerative Disease Prevention Knowledge				Totals	
	Good		Bad		F	%
	F	%	F	%		
Adults (26-35 years old)	37	74	13	26	50	100
Elders (46-70 years)	32	69.6	14	30.4	46	100

From the table 1, it can be seen that the knowledge of adult respondents is better (74%). From the hypothesis testing using Chi Square test, p-value  $0.0629 \geq 0.05$ , shows that  $H_0$  is accepted and it can be concluded that there is no correlation between ages and the knowledge of degenerative diseases prevention.

### Sex and Knowledge of Degenerative Diseases Prevention

**Table 2: The cross table describing sex and knowledge of degenerative diseases prevention**

Sex	Degenerative Diseases Prevention Knowledge				Totals	
	Good		Bad		F	%
	F	%	F	%		
Males	12	70.6	5	29.4	17	100
Females	57	72.2	22	27.8	79	100

Table 2 shows there are more female respondents who have knowledge of degenerative diseases prevention (72.2%). Hypothesis testing with Chi Square test, p-value  $0.005 < 0.05$ , shows that  $H_a$  is accepted and  $H_0$  is rejected. Thus, the conclusion is that there is a correlation between respondents' sex and respondents' knowledge.

### Education and Knowledge of Generative Diseases Prevention

**Table 3: The cross table describing education level and knowledge of degenerative diseases prevention**

Education Level	Knowledge of Degenerative Diseases Prevention				Totals	
	Good		Bad		F	%
	F	%	F	%		
Uneducated-Elementary School	38	82.6	8	17.4	46	100
Junior High School-Higher Education	31	62	19	38	50	100

From table 3, it can be seen that uneducated and elementary school graduated respondents have more knowledge of degenerative diseases prevention (82.6%).

Chi Square shows p-value =  $0.025 < 0.05$ , so  $H_0$  is rejected, hence there is a correlation between respondents' education level and knowledge of degenerative diseases prevention

### Occupation and Knowledge of Generative Diseases Prevention

**Table 4: The cross table describing occupation types and knowledge of degenerative diseases prevention**

Occupation	Degenerative Diseases Prevention Knowledge				Totals	
	Good		Bad		F	%
	F	%	F	%		
Non formal	53	72.6	20	27.4	73	100
Formal	16	69.6	7	30.4	23	100

Table 4 shows that respondents who have more knowledge of degenerative diseases prevention are the ones who work in informal sector (72.6%) compared to the ones who work in formal sectors (69.6%). The result of Chi Square hypothesis testing shows that  $p\text{-value } 0.778 \geq 0.05$  ( $H_a$  is rejected and  $H_o$  is accepted), and the conclusion is there is no correlation between respondent's jobs and generative diseases prevention knowledge.

**Credibility of Hospital Health Promotion Officers in Morning Dialogues and Knowledge of Degenerative Diseases Prevention**

**Table 5: The cross table between credibility of hospital health promotion officers in morning dialogues and knowledge of degenerative diseases prevention**

Officers' Credibility	degenerative diseases prevention Knowledge				Totals	
	Good		Bad			
	F	%	F	%	F	%
Credible	57	72.2	22	27.8	79	100
Not Credible	12	70.6	5	29.4	17	100

The officers' credibility in morning dialogues gives respondents the positive knowledge about degenerative disease prevention (72.2%). The hypothesis testing which used Chi Square test between the officers' credibility variable and the knowledge of degenerative diseases prevention variable shows  $p\text{-value } 0.018 < 0.05$  ( $H_a$  is accepted and  $H_o$  is rejected). Thus there is correlation between the officers' credibility and the respondent's knowledge of degenerative diseases prevention.

The communicator credibility of hospital health promotion officers through morning dialogues in imparting knowledge of degenerative diseases prevention<sup>3</sup> mentions at least there are two source credibility components namely expertness and trustworthiness<sup>4</sup>.

**Expertness:** Expertness is the impression formed by communicants about the ability of the persuasion communication source related to topic discussed<sup>4</sup>.

The hospital health promotion officers have enough skills to be a good campaign communicator because before doing campaign, they have received hospital health promotion training. Basically this training discusses strategies in hospital health promotion, persuasive communication, and public speaking.

**Trustworthiness:** Trustworthiness is the communicants' impression about persuasive communication sources related to characters like honesty, sincerity, moral compass, fairness, courtesy, ethical knowledge, and credibility<sup>4</sup>. The process of conveying persuasive messages is done through morning dialogues done by hospital health promotion officers.

**The message packaging of persuasive communication in morning dialogues with knowledge of degenerative diseases prevention**

**Table 6: The cross table describing message packaging of persuasive communication in morning dialogues and knowledge of degenerative diseases prevention**

Message packaging of persuasive communication in morning dialogues	Knowledge of degenerative diseases prevention				Totals	
	Yes		No			
	F	%	F	%	F	%
Clear	55	72.4	21	27.6	76	100
Unclear	14	70	6	30	20	100

The message packaging of persuasive communication in morning dialogues makes respondents clearly understand the messages conveyed for knowledge of degenerative diseases prevention (72.4%).

Based on hypothesis testing result with Chi Square test on the two variables, it shows  $p\text{-value } 0.022 < 0.05$  which means  $H_a$  is accepted and  $H_o$  is rejected. Therefore, it can be concluded that there is correlation between the message packaging of persuasive communication and the knowledge of degenerative diseases prevention.

Verbal messages are all kinds of symbols that use one word or more. Language, in this context, is categorized as verbal communication. The verbal language is the main medium to express our thoughts, feelings, and intentions. Verbal communication uses words representing various individual reality aspects<sup>5</sup>. In persuasive communication, to give style to the messages is an important aspect because it can give more interesting "package" to the messages to be "consumed" An effective language has three elements namely clarity, simplicity, and accuracy. A clear, simple, and accurate language can help persuaders to create impressions and to influence behaviors and knowledge of target markets<sup>6</sup>.

- a. Eisenberg Clarity (1984) explains that clarity emerges from the combination of source factors, messages, and communicants. To be clearly understood, common and concrete words are chosen, and language style is explained by giving clues <sup>4</sup>. The process of delivering messages performed by the hospital health promotion officers focuses on language use when communicating with checkup patients, from different ages and characters, during morning dialogues at the waiting room. Firstly, information about the origin of degenerative diseases and how to implement the healthy life knowledge in order to prevent degenerative diseases are given; such as having breakfast in the morning, consuming food containing balanced nutrition, consuming water daily, doing exercise, having enough time to get rest, cutting down fatty food consumption, and avoiding stress.
- b. Straightforwardness refers to feeling, and it creates unforgettable moments. A straightforward language can help communicants to see, hear, touch, feel, and smell impressions and ideas <sup>6</sup>. A straightforward language pattern can be improved by using metaphorical words and syntactical devices <sup>4</sup> Words that are easily remembered by communicants are chosen to create either positive or negative emotion effects. Persuasive messages are then “packed” with invitation or persuasion, so they do not appear as coercive messages. The examples of these messages are “*Ayoo, cegah penakit jantung dengan berolahraga dan hindari makanan berlemak*” (“Let’s prevent cardiac arrest by doing exercise and avoiding fatty foods”), “*saya rutin chek up untuk cegah penyakit degeneratif*” (“I do routine checkup to prevent generative diseases”), “*Ini Aksiku!!! Mana Aksimu?*” (“It’s my action!!! Where’s your action?”). In addition, there are also statements containing persuasive messages that are delivered implicitly to discover facts related to the danger of degenerative diseases.
- c. The language accuracy can create direct personal connection between individuals and target markets. Thus, to use language accurately, we must (1) avoid “bad-tasted words”, (2) use words according to their contexts, and (3) use straightforward words <sup>4</sup>. In morning dialogues,

the chosen words are not the patronizing ones, and the message delivery uses more polite and simple language like “*Sebelum kesekolah, kekampus dan kekantor, yuuuk Sarapan*” (“Want to go to school, campus, or office? Let’s have breakfast first”) Using common language makes the patients doing checkup feel more comfortable in the atmosphere of togetherness which eventually lead them to understand the knowledge of degenerative diseases prevention well.

**Time Spent in Listening Morning Dialogues and Knowledge of Degenerative Diseases Prevention**

**Table 7: The cross table describing time spent in listening morning and knowledge of degenerative diseases prevention**

Time Spent in Listening Morning Dialogues	Knowledge of Degenerative Diseases Prevention				Totals	
	Good		Bad			
	F	%	F	%	F	%
Good	57	72.2	22	27.8	79	100
Bad	12	70.6	5	29.4	17	100

The respondents have good knowledge about degenerative diseases prevention (72.2%). From hypothesis testing result using Chi Square test on both variables, it shows that p-value  $0.025 < 0.05$  which means that  $H_a$  is accepted and  $H_o$  is rejected. Therefore, it can be concluded that there is correlation between time spent in listening morning dialogues and knowledge of degenerative diseases prevention.

**Choosing Morning Time to Conduct Dialogues and Knowledge of Degenerative Diseases Prevention:** The successful communication between patients and hospital health promotion officers in morning dialogues gives comfort and satisfaction for both sides. The ability of the officers to communicate persuasively makes patients feel comfortable and choose time to listen carefully the message; and furthermore, this following condition is due to the way the officers deliver the messages, the way these officers behave politely, the way they give their attention, the way they listen the patients carefully, and the way they show empathy. For the purpose of giving accurate and well-structured information, a hospital health promotion officer needs to master persuasive communication skill to be able to communicate with patients.

**Table 8: The cross table describing choosing morning time to conduct dialogues and knowledge of degenerative diseases prevention**

Choosing Morning Time to Conduct Dialogues	Knowledge of Degenerative Diseases Prevention				Totals	
	Yes		No			
	F	%	F	%	F	%
Proper	56	73.7	20	26.3	76	100
Improper	13	65	7	35	20	100

The choosing morning time to conduct dialogues is considered appropriate by respondents (73.7%). The result of hypothesis testing that employed Chi Square test on the two variables shows p-value  $0.018 \geq 0.05$ . It means that  $H_a$  is accepted and  $H_o$  is rejected showing that there is correlation between choosing morning time to conduct dialogues and knowledge of degenerative diseases prevention

Choosing morning time to perform dialogues creates pleasant and conducive atmosphere that can give positive effect to persuasive communication process and knowledge of degenerative diseases prevention.

**CONCLUSION**

Persuasive communication in morning dialogues is useful for the Hospital Health Promotion Officers in Sultan Agung Islamic Hospital, Semarang to educate patients doing checkup, so these patients can have knowledge about preventing degenerative diseases.

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**Ethical Clearance:** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards

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# Oral Health Program for School Children: Dependent or Independent UKGS Program

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## ABSTRACT

Oral Health Program for School Children (UKGS Program) has been implemented by Community Health Center since 1951 but the result isn't satisfied yet. National research on Health 2013 has found that the dental caries prevalence among children in Indonesia has increased by 13,7%. Due to this condition, Dental Nurse Department (JKG) Poltekkes Semarang had tried to implement independent UKGS Program in a school.

This study was quantitative descriptive with a cross-sectional approach. The population was from SD Padangsari 01 handled by Padangsari Community Health Center and - for further- called as Dependent UKGS Program and SD Antonius 02 handled by JKG and called as Independent UKGS Program. The samples were 46 students which were 8-12 years old. Each school was observed about their facilities and UKGS services and the samples were reviewed about their caries status, oral hygiene, and saliva condition. The data would be analyzed statistically and presented in the tabulation.

There was a significant difference between the facilities and services of dependent and independent UKGS Program (p-value: 0.000). In the independent group, there was no poor oral hygiene and the caries status was low to moderate (91.30%-100%). But in the dependent group, there was no good oral hygiene and the caries status was low to high (34.78%-43.48%). The saliva condition of the independent group was better than on the dependent group.

The effect of implementation of independent UKGS Program handled by JKG was more satisfied than dependent one handled by Padangsari Community Health Service.

**Keywords:** *Oral Health Program for School, UKGS*

## INTRODUCTION

UKGS Program has been implemented in Indonesia since 1951. This Program is handled by the Community Health Centers (Puskesmas) in Indonesia to reduce the caries prevalence among school children. The programme consists of promotive, preventive, curative and referral activities. Unfortunately, the result of this UKGS program is not satisfied yet. According to National Resesearch (2013), there are 24.8% of children

suffered dental health problems and there are only 1.8 % who brush their teeth correctly<sup>1</sup>. The caries prevalence among school children has increased by 13.7%. Besides, there is also a decline in dental health manpower in Community Health Centers and Hospitals<sup>2</sup>.

Due to this condition, independent UKGS or UKGS on School-Based could become the solution. It was designed to improve access to dental care by reducing barriers for all children. Simple dental clinic handled by a dentist and a dental nurse from JKG has been built in UKS room of SD Antonius 02. Every semester, there was a report of this Program to JKG and Padangsari Community Health Center. The costs were covered by students' contributions. This independent UKGS Program had some services including Dental education, Oral screening, Fluoride application, Fissure sealant, milk dentition extraction and Referral for follow up dental treatment. This program might eliminate the

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barriers to take dental treatments. School becomes a non-threatening environment for children so moving “dental clinic” to school could influence the children in fending of dental health services.

This study wanted to know the differences between the UKGS Program of Community Health Center (dependent UKGS) and UKGS Program on School-Based (independent UKGS). SD Padang Sari 01 (control group/dependent UKGS) and SD Antonius 02 (intervention group/independent UKGS) are schools under Padang Sari Community Health Center’s Jurisdiction. This independent UKGS might improve the goals of UKGS program on decreasing dental caries prevalences among children.

**METHOD**

This study was descriptive research with cross-sectional approach. The population was 46 students of SD Santo Antonius 02 (intervention group/independent UKGS) and SD Padang Sari 01 (control group/dependent UKGS). These two groups were observed about their UKGS facilities, services and the results of UKGS services.

Their facilities were observed by using checking list observation including manpower, dental instruments and material, environment, schedules of implementation of UKGS Program, trained teachers, and MoU between school and Padang Sari Community Health Center

The services were observed by using checking list observation including training for UKS teachers and “little doctor”, Dental education, oral screening, preventive activities, emergency curative, dental treatments, and surface protection.

The result of services was observed by examining children’s dental health clinically including<sup>3</sup>:

- a. DMF-T, DMF-S index: the index to express the caries problems of permanent teeth
- b. def-index: the index to express the caries problems of milk dentition
- c. OHI-S index: the index to express the oral hygiene
- d. Plaque index: the index to express the thin layer covered teeth surfaces
- e. Saliva condition: expressed by quantity and viscosity of saliva

**RESULTS AND DISCUSSIONS**

**Facilities of UKGS:** The facilities of UKGS in SD Padang Sari 01 – the control group – were not adequate to support the UKGS Program. There were no clinical equipments at a school to facilitate dental treatment. Students who needed emergency or simple dental treatment should go to the Padang Sari Community Health Center. Besides, there were no routine schedules for implementing the UKGS Program.

**Table 1: Frequent Distribution of Facilities and Services of UKGS in Intervention and Control Group**

UKGS Program	Mean ± SD	Min	Max	Criteria	P value
<b>UKGS Facilities</b>					
<b>Independent</b>	2,7 ± 0,5	1	3	Adequate	0.000
<b>Dependent</b>	1,5 ± 0,6	1	3	Not Adequate	
<b>UKGS Services</b>					
<b>Independent</b>	2,6 ± 0,5	1	3	Good	0.000
<b>Dependent</b>	1,6 ± 0,5	1	2	Poor	

**Services of UKGS:** The services of UKGS in SD Padang Sari (control group) were only implemented 8.3 – 66.7% in a year but 60.6–100% in SD Antonius 02 (intervention group)

**Table 2: Frequent Distribution of UKGS Services in Intervention and Control Group**

	Services	Independent UKGS		Dependent UKGS	
		N (times/year)	%	N (times/year)	%
1.	Training of teacher and little doctor	2	100	1	50
2.	Dental education	12	100	2	16.7
3.	Mass tooth-brushing	12	100	1	8.3

Conted...

4.	Oral screening	3	100	2	66.7
5.	Preventive activities	12	100	--	--
6.	Emergency curative	35 of 35 cases	100	--	--
7.	Dental treatments	40 of 66 cases	60.6	--	--
8.	Referral activities	26 of 26 cases	100	--	--

### Clinical Result

**Oral Hygiene:** The condition of oral hygiene and Plaque on SD Antonius 02 (intervention group) is good to moderate and there was no poor oral hygiene. On contrary, there was no good oral hygiene and plaque condition on SD Padangsari 01 (control group). The oral hygiene was in line with dental plaque. The existence of dental plaque could influence the Oral Hygiene index (OHI-S). There was also a significant difference between two groups on OHI-S and Dental Plaque (*p value* 0.000).

**Table 3: Frequent Distribution of Oral Hygiene Index and Plaque Index in Intervention and Control Group**

UKGS Program	N	Criteria			Min	Max	P value
		Good	Moderate	Poor			
		Mean ± SD	Mean ± SD	Mean ± SD			
<b>OHI-S</b>							
Independent	23	0,9 ± 0,3	1,8 ± 0,4	0	0,3	2,8	0.000
		34.78%	65.22%				
Dependent	23	0	2,4 ± 0,4	3,8 ± 0,3	1,5	4,1	
			52.17%	47.83%			
<b>Plaque Indeks</b>							
Independent	23	1,1 ± 0,5	2,1 ± 0,3	0	0,3	2,5	0.000
		52.17%	47.83%				
Dependent	23	0	2,0 ± 0,5	3,9 ± 0,4	1,8	4,5	
			65.22%	34.78%			

**Caries Status:** There was no high caries of permanent and milk dentition on SD Antonius 02 but there was 13.04%-34.78% high caries on SD Padangsari 01

**Table 4: Frequent distribution of Caries Status in Intervention and Control Group**

UKGS PROGRAM	N	CRITERIA			P value
		Low	Moderate	High	
		Mean ± SD	Mean ± SD	Mean ± SD	
<b>DMF-T</b>					
Independent	23	1,0 ± 0,8	0	0	0.000
		100%			
Dependent	23	1,2 ± 0,6	3,8 ± 0,4	7,2 ± 1,7	
		43.48%	17.39%	34.78%	
<b>def-t</b>					
Independent	23	0,4 ± 0,7	3,5 ± 0,7	0	0.044
		8.70%	91.30%		
Dependent	23	0,5 ± 0,6	3,2 ± 0,4	5,3 ± 0,6	
		56.52%	21.74%	13.04%	

Conted...

DMF-S					
Independent	23	0,9 ± 1,0	0	0	0.000
		100%			
Dependent	23	3,4 ± 2,4	13,0 ± 2,8	0	
		39.13%	26.09%		

**Saliva Condition:** Quantity saliva in normal criteria is higher in SD Antonius 02 (21.74%) than SD Padangsari 01 (17.39%). The salivary viscosity in SD Antonius 02 was low to moderate but was moderate to high in SD Padangsari 01

**Table 5: Frequent Distribution of Saliva Condition on Intervention and Control Group**

UKGS PROGRAM	N	SALIVARY QUANTITY			Min	Max	P value
		Very low Mean ± SD	Low Mean ± SD	Normal Mean ± SD			
Independent	23	3,2 ± 0,3 34.78%	4,1 ± 0,2 43.48%	5,3 ± 0,5 21.74%	3	6,5	0.005
Dependent	23	2,5 ± 0,8 47.83%	4,0 ± 0,0 34.78%	5,0 ± 0,0 17.39%	1	5	
		SALIVARY VISCOSITY					
		Low Mean ± SD	Moderate Mean ± SD	High Mean ± SD			
Independent	23	1.5 ± 0.5 47.83%	1.4 ± 0.5 52.17%	0	3	6,5	0.005
Dependent	23	0	2.0 ± 0.0 82.61%	3.0 ± 0.0 17.39%	1	5	

Independent UKGS or UKGS on School-based could give some advantages for students and parents. Parents would keep informed about their children's dental problems or treatments and they didn't have to provide their time to fulfill their children's dental appointments. In addition, children were not afraid of getting dental treatments in school due to the familiar and non-threatening environment<sup>3</sup>. For schools, this program offered the benefit of reducing time out of the classroom for each child who might otherwise take time during the day for a trip to the dentist. For Community Health Center, this program provided reports every semester so the data could be monitored and evaluated.

There was a significant difference between these two groups on facilities and services. The inadequacy of facilities could influence the given services and give a bad impact on the customers' satisfaction<sup>4</sup>. Padangsari Community Health Center only have 1 dentist and 1 dental nurse to cover the UKGS Program in 11 schools under their jurisdiction. The lack of manpower had a significant influence on the quality of service<sup>5</sup>. This independent UKGS Program could help Community Health Center to reach the goals of UKGS. Independent

UKGS could solve the problem or inadequacy of facilities by bringing the program to a school and focusing on it so it could give a better result at the end.

Children with poor oral health and dental problems may be unable to concentrate and learn, complete school work and score well on tests<sup>6</sup>. Poor oral health has been related to decreased school performance, poor social relationships and less success later in life<sup>7</sup>. There was significant difference between these two groups on caries status (*p value* 0.000 and 0.044). The caries status of children in the intervention group was better than the control group. Oral screening three times a year or every four months for all students could find out and follow up new problems of their dental health. In addition, dental education and mass tooth-brushing activities could influence children's mindset and behavior in maintaining their oral condition rightly. Fluoride, a naturally occurring element, plays a critical role in the prevention of tooth decay. Topical fluorides, such as toothpaste, rinses and professionally applied fluoride treatments provide a complimentary benefit for the prevention of tooth decay<sup>8</sup>.

There were significant differences on salivary quantity and viscosity. (*p value* 0.005). The condition of saliva (quantity and viscosity) could influence the existence of Dental Plaque which has an important role in caries formation. Dental Plaque is a bacteria thin layer formed within minutes on the clean tooth surface<sup>9-10</sup>. In this study, the viscosity and quantity of saliva were in line with the growth of dental plaque. Salivary Viscosity and plaque index in the intervention group (low to moderate) was better than control one (moderate to high). When salivary viscosity increased, the water content would be decreased with an increased salivary thickness<sup>11</sup>. As a result, the cleansing effect of the saliva to remove plaque and bacteria became low. This condition could increase the susceptibility to dental caries<sup>12</sup>.

### CONCLUSION

Independent UKGS or UKGS on School-based could become a broad spectrum of programs, policies, activities, and services that take place in schools and their surrounding communities. This concept not only modified individual behavior but also enabled one to modify his/her environment. Besides, the result of this concept could decrease the caries status, maintain the oral hygiene and salivary viscosity. At last but not least, it could reach the UKGS goal to decrease children's caries prevalences.

**Conflict of Interest:** The authors declare that there is no conflict of interests. No funding was received for this study or it was nil.

**Ethical Clearance:** The Ethical clearance was taken from the Ethic Committee of Health Polytechnic of Semarang- Indonesia.

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# Assessing Noise-Exposure and Daily Habits Can Cause Hearing Loss among Ladies Club at Nightclub

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## ABSTRACT

The majority problem in the workplace is about occupational noise-exposure. Health problem caused by noise becomes one of the important issues that must be observed. Nightclub owners often forgot about the health of their workers, especially hearing problem. The workers who works at nightclub are exposed to noise every time will putting their hearing at risk. The study aims to classify into levels of noise exposure, classify into levels of hearing loss, and assessing daily habits that can cause hearing loss. This research was cross-sectional study, where 62 ladies club were participated. As for the measurement in this study was used two methods such as: the tools (sound level meter for measuring intensity of noise exposure, audiometer for hearing problem), and questionnaires were assessed for daily habits. The mean of noise at nightclub was 107.22 dBA. A total of 51 workers (82.3%) had hearing loss (mostly at the level of mild 45 workers, and 6 workers in the level of moderate), while 11 respondents (17.7%) did not experience any hearing loss (normal). The statistical test found that hobby and smoke were strongest predictor may affect to hearing loss (p value < 0.05). Intensity noise all of nightclub exceeds the threshold value where the workers are works more than 4 hours a day. There are no management at nightclub doing regularly inspections the worker's ear. Doing the job rotation system it was a good solution to prevent from hearing loss.

**Keywords** *Nightclub, Noise-exposure, Hearing loss*

## INTRODUCTION

A major environmental problem in many countries is about noise. The loud sound may damage hearing instantly. Prolonged exposure to loud noise can lead to a gradual, but permanent of hearing loss<sup>1</sup>. A study conducted by World Health Organization (WHO) found that approximately 16% of the world's population endures hearing loss caused by occupational exposure to noise<sup>2</sup>. High noise intensity and prolonged exposure can cause hearing loss. Hearing loss is a disease that damages and occurs in both ears can be divided into three types of

levels such as mild, moderate, or severe<sup>3</sup>. The impact of hearing loss may be profound, with consequences for the social, functional, and psychological well-being of the person such as insecurity, guilt and anger, concentration problems, less confident, and also feelings of humiliation<sup>4</sup>.

Genesis hearing loss causes DALY (Disability-Adjusted Life Year) more than four million, received disability related to hearing loss. DALY number found that males larger than females. Regulations controlling noise exist but are rarely enforced. For an example, countries in Southeast Asia have regulations regarding to prevention from hearing loss, but unfortunately it lacks of implementation<sup>5</sup>.

Along with the development and modernization in the industrial sector, health problem caused by noise becomes one of the important issues that must be observed. The workers who works at the entertainment sector are also could harm to the both ears. Many overseas research indicates that musicians and discotheques workers were exposed to loud music constantly throughout the work shift and putting their hearing at risk. <sup>6</sup>.

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According to Hendarmin (1990) who conducted an investigation on the level of danger caused by loud disco music (between 100-110 dBA) shows that loud music can damage one's hearing<sup>6</sup>. Duration of action permitted by the Indonesian government by the labor minister decision No. 51/Men/1999 of the maximum noise limit in the workplace mentioned that if the noise level more than 100 dBA, then the worker should only work less than 15 minutes. But in reality they worked more than 4 hours a day.

Exposure to high levels of music in the entertainment industry has long been an important concern to those interested in hearing conservation. Due to much longer exposures to loud music, it is reasonable to believe that the hearing of employees working in the music entertainment industry is at much greater risk. Therefore, hearing loss among employees working in the music entertainment industry is a more important concern that needs to be studied<sup>7</sup>. The study aims to classify into levels of noise exposure, classify into levels of hearing loss, and assessing daily habits that can cause hearing loss.

## METHOD

A cross-sectional research was conducted among 5 nightclub in Tarakan, North Borneo, Indonesia. This research used total sampling as a sampling technique. A total of 62 ladies club volunteered to take part in this research as study samples. This research mainly consists of two methods such as: the tools (sound level meter for measuring intensity of noise exposure, audiometer for hearing problem), and questionnaires were assessed for daily habits.

**Sound Level Meter:** This research used Sound Level Meter (SLM) type 2 840029. The SLM has been calibrated by Universitas Muhammadiyah Kalimantan Timur. The SLM recorded the noise exposure to establish a noise intensity each nightclub.  $L_n$  (noise in the night) =  $10 \times \log \frac{1}{8} (T5 (2 \text{ hours the first time range}) \times 10^{0.1 \times L5}$

(Noise taken on 23:00 as a represent on 22.00-24.00) + T6 (3 hours the second time range,)  $\times 10^{0.1 \times L6}$  (Noise taken on 01:00 as a represent on 24.00-03.00) + T7 (3 hours the third time range)  $\times 10^{0.1 \times L7}$  (Noise taken at 03:00 as a represent at 03.00-06.00) dBA<sup>13</sup>.

**Audiometer:** For determine level the hearing of workers, the researcher used Audiometer type Oscilla SM930, and the result of hearing loss was classified into: normal (<24 dB) mild (> 25 to 40 dB), moderate (> 40 to 55 dB) and severe (> 55 dB). The audiometric test was done after 14 hours of the last noise exposure to recovery from temporary threshold shift.

**Questionnaire:** The core question questionnaires were consisted by two parts as follow: socio-demographic (the first of questionnaire identified personal information of respondents including age the workers, educational background) and health habits (the behavior of health workers every day. In this case if they do exercise or no, smoking habit, alcohol consumption, and hobbies).

**Data Analysis:** Descriptive statistics was presented with frequency, percentage, mean, standard deviation for measure each variable. For inferential statistics, Chi-square test was done to find out the significant association between daily habits may cause hearing loss.

## RESULTS AND DISCUSSIONS

### Results

**Demographic Characteristics:** Socio-demographic characteristics of the respondents are shown in Table 1. The mean age of the respondents was 22.6 years old, with a minimum age of 19 years and maximum age of 28 years. Table 1 also showed that total of 45 respondents (72.6%) from 62 respondents had hobbies related to high sound. Smoking characteristics of the respondents can be seen from Table 1 as well. The mean (SD) number of family members who smoked was 12.4 bars per day (7.51). Table 1 explained that 52 respondents (83.8%) consumed alcohol every day.

**Table 1: Frequency Each Variable**

Characteristics	Level	n = 62	Percentage (100%)
Age	Later Adolescence (17-25 years)	57	91.9
	Early Adulthood (26-35 years)	5	8.1
Mean: 22.6	SD: 2.18	Min: 19	Max: 28
Education	Secondary school	15	24.2
	High school	47	75.8

Conted...

Hobbies	Not related to loud sound	17	27.4
	May cause hearing loss	45	72.6
Hobbies	Not related to loud sound	17	27.4
	Attend live music concert	7	11.3
	Diving	7	11.3
	Listening to music through headphones or earphones	20	32.3
	Play music at studio	11	17.7
Smoke	Non smoker	21	33.9
	Smoker	41	66.1
Cigarette Consumption	Non smoker	21	33.9
	10-19 bars per day	8	12.9
	20 bars per day or more	33	53.2
<i>Mean: 12.4</i>	<i>SD: 7.51</i>		
Drinking Alcohol	Non drinker	5	8.1
	Drinker	57	91.9
Alcohol Consumption	Non drinker	5	8.1
	Frequent drinker	5	8.1
	Regular Drinker	52	83.8
Exercise Activities	Physically Active	8	12.9
	Physically Inactive	54	87.1
Time to do exercise	Regular Exercise	4	6.5
	Occasional Exercise	4	6.5
	No Exercise	54	87.0

**Noise Exposure Each Nightclub:** After measurement and calculate of noise exposure ( $L_n$  = noise in the night) by using formulas, the researcher found that nightclub 1 had the highest noise exposure (117.5 dBA), while the nightclub 5 had the lowest noise exposure (101.5 dBA).

**Table 2: Noise Exposure Among 5 Nightclubs**

Nightclub	Exposure level			Total noise exposure level
	T1 (23.00)	T2 (01.00)	T3 (03.00)	
Nightclub 1	106.4 dBA	117.9 dBA	119.3 dBA	117.5 dBA
Nightclub 2	98.7 dBA	103.4 dBA	111.5 dBA	107.9 dBA
Nightclub 3	98.7 dBA	101.7 dBA	110.3 dBA	106.8 dBA
Nightclub 4	96.9 dBA	99.3 dBA	105.4 dBA	102.4 dBA
Nightclub 5	96.2 dBA	98.1 dBA	104.5 dBA	101.5 dBA

**Hearing Loss:** By using audiometer for calculation of hearing loss among 62 respondents, the researcher found that a total of 51 respondents (82.3%) had hearing loss, while 11 respondents (17.7%) did not experience any hearing loss (normal). Total 51 respondents who indicated experiencing hearing loss, mostly at the level of mild (45 respondents), while 6 respondents at the level of moderate.

**Table 3: Level of Hearing Loss Among Ladies Club**

Category	n = 62	Percentage (100%)
Normal	11	17.7
Mild	45	72.6
Moderate	6	9.7

**Association between Daily Habits and Hearing Loss:** After using statistical analysis daily habit variables, found only 2 variables (hobbies related to high noise, and daily smoking habits) are very influential on the occurrence of hearing loss ( $p$  value  $<0.05$ ). The result of analysis shows that respondents who have hobbies related to high noise can have 91.1% hearing loss, while respondents who have hobbies unrelated to high noise have a chance of hearing loss of 58.8%. Respondents who have a hobby can cause hearing loss 7.175 times greater than respondents who have a hobby unrelated to noise. For variable smoking habit, the respondents as a smoker had 90.2% chance of experiencing hearing loss compared with respondents who do not smoke (the chance of hearing loss is only 66.7%).

**Table 4: Association between daily habits and hearing loss**

Independent variables	Hearing Loss		Total	OR	p-value
	No	Yes			
<b>Hobbies</b>					
No related to loud sound	7 (41.2%)	10 (58.8%)	17 (100%)	7.175 CI = 1.752 – 29.377	0.009*
May cause hearing loss	4 (8.9%)	41 (91.1%)	45 (100%)		
<b>Smoke</b>					
Non smoker	7 (33.3%)	14 (66.7%)	21 (100%)	4.625 CI = 1.171 – 18.270	0.021*
Smoker	4 (7.3%)	37 (90.2%)	41 (100%)		
<b>Alcohol</b>					
Non drinker	1 (20%)	4 (80%)	5 (100%)	1.175 CI = 0.118 – 11.663	0.890
Drinker	10 (17.5%)	47 (82.5%)	57 (100%)		
<b>Exercise</b>					
Physically active	2 (25%)	6 (75%)	8 (100%)	1.667 CI = 0.289 – 9.620	0.936
Physically inactive	9 (16.7%)	45 (83.3%)	54 (100%)		

\*=  $p < 0.05$

## DISCUSSION

The results showed that the intensity of noise among nightclub in Tarakan exceeds the threshold value determined by the Ministry of the Republic of Indonesia at 85 dB for 8 hours per day. The average noise at nightclub was 107 dBA. Hearing loss can be experienced by workers who are complaints related to noise exposure levels and frequencies based on the results of audiometric examination, found that as many as 51 workers have a hearing loss, while 11 workers did not experience hearing loss (normal). Hearing loss can be temporary or permanent. Temporary hearing loss results from short-term exposures to noise, with normal hearing returning after period of rest. Generally, prolonged exposure to high noise levels over a period of time gradually causes permanent damage<sup>8</sup>. An initial hearing loss may be temporary first and develop to the permanent hearing loss.

The intensity of the noise affecting the hearing loss as research conducted by Gunderson in workers obtained

music club workers working at nightclub, that has the highest noise sound have more symptoms of tinnitus after work and were more likely to perceive a hearing deficit after work<sup>10</sup>. The duration of noise exposure in a single day and duration work at nightclub may affects the occurrence of hearing loss. Ladies club are works more than 4 hours a day and work every day. Nancy (2008) on their research found that long-term may have become desensitized to the perception of hearing loss or tinnitus after work or they may have experienced a permanent threshold shift in hearing<sup>9</sup>.

Hobbies were contributed to the hearing status of workers. Related noisy hobbies that noise exposure to workers certainly increase hearing loss. Meanwhile, a hobby related to the environment of high pressure such as diving, hobbies associated with exposure to high noisy e.g. shooting with firearms, racing bike/car, listening to loud music and others can cause hearing loss<sup>6</sup>. The results showed that 45 (72.6%) respondents had a hobby may cause hearing loss. Listening to music through earphone/



headphone is a hobby type most favored by respondents (20 respondents), as many as 7 respondents liked the hobby of diving, 11 respondents liked the hobby of playing music in the studio, and only 7 respondent who liked like watching a concert event. If all this noise at nightclub reached an average of 107 dBA, then the favored hobbies workers are used earphones to listen the music, the ear for hearing-impaired workers will be higher. Frequency of listening to music has a close relation to the risky behaviors that can lead to hearing loss trigger.

Smoking is one of the common habits in all social levels including workers. Mizoue et al. (2002) studied on 4624 workers in metal factory in Japan. Exposure to noise was proved by recorded data of the factory. A logical review was performed to determine the relation between smoking dose and hearing response. The results showed smoking can be an important factor in hearing loss in high frequencies<sup>11</sup>. The other research has been conducted by Mohammadi et al. in Yazd Sadooqi University (2010), studied on 622 workers of wagon factory. Periodical audiometry was performed in an acoustic room for all of them after at least 14 hours passed from exposure to noise. Results have shown that risk of cochlea damage in smokers were 5 to 6 times more than in non-smokers<sup>12</sup>. Influx of blood circulation system in cochlear organ caused by smoking is the cause of hearing loss in high frequency progressive and most often occurs in old age. A total of 41 respondents from 62 workers at a nightclub were smoked. The study says that the average worker spends as much as smoking 12.4 cigarettes a day.

## CONCLUSIONS

Noise is unwanted sound produced by a wide variety such as DJ music through the loudspeaker. Measurement of noise intensity at nightclub was carried out by using the Sound Level Meter for 3 times and starts from 23:00 PM to 03:00 AM. The calculation results show average noise at nightclubs were 107 dBA, where the ladies club works from 22.00 PM to 04.00 AM. Significant hobbies such as diving, coming to live music concerts, play music at studio, diving, and listening to music using headphones/earphones can cause hearing loss. In addition, smoking is also another factor that can cause hearing loss.

Special attention is required for the owner of the nightclub owner to pay more attention to the health of

the workers' ears. The calculation of hearing power before starting work at nightclubs and thereafter needs to be done to find out more if noise can cause hearing loss. Work rotation also needs to be done in order to restore the hearing of workers after exposure to noise. For the government, also need to socialize and campaign about workers health especially ear health. Besides using SLM as a noise measurement, personal noise dosimeter is also needed to measure noise exposure level received by each workers when they are working.

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**Conflict of Interest:** The authors declare that there are no conflict of interests from this study.

**Ethical Clearance:** The ethical clearance was obtained from Lembaga Penelitian dan Pengabdian Masyarakat, Universitas Katolik Indonesia Atma Jaya, Jakarta No: 532/III/LPPM-PM.10.05.06/2016.

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# Associated Factors of Latent Tuberculosis among Diabetics in Urban Health Clinics

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## ABSTRACT

Mycobacterium tuberculosis infection causes significant morbidity and mortality worldwide. Among the risks for tuberculosis is diabetes, which triples the risk of tuberculosis compared to non-diabetics. One of the effective strategy to reduce the transmission, morbidity, and mortality of active disease among diabetic patients is the identification of latent tuberculosis infection (LTBI). This study aimed to determine the prevalence of LTBI and its associated risk factors among diabetic patients in urban health clinics. This cross-sectional study was conducted at three randomly selected urban health clinics in Terengganu. Participants (n=362) were administered with Tuberculin Skin Test (TST) and interviewed to obtain the socio demographic and clinical data. Simple and multivariate logistic regression were applied to test for the significant associated factors of LTBI. The prevalence of LTBI among diabetic patients was 5.8%. This study revealed that the associated factors for LTBI were having higher glycated haemoglobin (HbA1c) (p=0.016, OR=14.23), smoking (p=0.046, OR=3.78), asthma (p=0.049, OR=5.79) and history of TB contact (p= <0.001, OR=6.92). Active screening, infection control measures and glucose controls are recommended in reducing the risk of LTBI and reactivation of LTBI.

**Keywords:** Latent Tuberculosis Infection (LTBI); Tuberculin Skin Test (TST); Diabetes

## INTRODUCTION

Tuberculosis (TB) in adult is an important public health problem with over 8.6 million people suffering TB infection and as many as 1.3 million deaths from TB annually<sup>[1]</sup>. Despite this tremendous global burden, case detection rate in Malaysia continues to be low; from 93 TB cases per 100 000 people in year 2014 reduce to 89 TB cases per 100 000 in year 2016<sup>[2]</sup>.

Exposure to mycobacterium tuberculosis (MTB) complex causes significant morbidity and mortality worldwide. Latent tuberculosis infection (LTBI) is a condition when MTB complex unreactive state; MTB may alive in body but no symptoms of TB with normal

chest radiograph<sup>[3, 4]</sup>. MTB will adherence to a distinct cell wall as a bacteria's survival and these cell wall consist of mycolic acid ( a fatty acid) that give a strong lipid barrier to the MTB<sup>[5]</sup>. Nevertheless, some studies revealed only 5-10% people who are infected with LTBI will develop into active TB<sup>[4, 6, 7]</sup>.

At the same time, diabetes mellitus (DM) prevalence is soaring globally, fuelled by obesity, changing patterns of diet, physical activity and aging population and thus DM was dramatically increase. Worldwide, about 422 million person suffering DM<sup>[8]</sup> and this immunocompromised state triples the risk of TB; and conversion rate to active TB is higher and faster<sup>[7, 9, 10]</sup>. Therefore, early screening and intervention of LTBI among diabetic patients can early recognize LTBI and thus may help control the progression of LTBI into active TB and improve the outcome.

A study on influence of diabetes mellitus and risk factors in activating latent TB infection in Malaysia

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concluded that there is a need to improve the screening of latent TB amongst patients with risk factor by early intervention through tuberculin skin test (TST) or interferon gamma releasing assay (IGRA) amongst high risk patients such as diabetes mellitus [11]. This would help to cultivate positive attitude, formulate a more economical screening strategies and better preventive practices among diabetes patients to reduce latent tuberculosis infection in the country.

The objective of this study is to determine the prevalence of LTBI among diabetic patients at a community level and to evaluate the association between associated factors and LTBI status. The outcome of this study could provide an insight on the prevalence and its risk factor of latent tuberculosis infection among diabetes patient in Terengganu.

## METHOD

This cross-sectional study was conducted from July 2017 to March 2018. The target population for this study was diabetic patients attending urban health clinics. Urban clinics were defined as clinic in area that are located 35 km from the main city. Simple random sampling was applied to choose the health clinics where three out of five health clinics in urban area of Terengganu were chosen. Sample size was calculated using PS software where minimum of 315 samples were needed. Systematic random sampling with 1:1 ratio was then applied to choose samples among diabetic patients who attended the clinics during the study period.

All diabetic patients participated in this study on a voluntary basis and fulfilled the inclusion criteria. The inclusion criteria were: age  $\geq 18$  years, having diabetes mellitus diagnosed at least 12 months and with no mental health problems (Fig. 1).

## DATA COLLECTION

After signing the consent form, participants completed an interviewer-administered questionnaires covering socio-demographic characteristic, includes of history contact with TB patients, smoking status, occupational, environmental and others comorbidities such as hypertension, hyperlipidaemia, asthma, chronic obstructive pulmonary disease, systemic lupus erythematosus, and rheumatoid arthritis. Clinical data was obtained by looking up the medical records.

**Diagnosis of LTBI:** To diagnose LTBI, diabetic patients were tested with tuberculin by trained nurses. The standard tuberculin test (TST) consists of an intracutaneous injection of 0.1 ml (5 tuberculin units) of purified protein derivative (PPD) into the volar forearm. The reaction was read 48 to 72 hours after injection. The size of the reaction was determined by measuring the diameter of induration in millimetres (mm). The indurated area refers to the raised region, not the surrounding erythema. The "pen technique" was used to distinguish the indurated area from the surrounding erythema. To employ this technique, a line was lightly drawn with a pen in the horizontal and vertical planes until the edge of the induration was reached. To determine the size of the reaction, the induration was measured transversely to the long axis of the long axis of the forearm from the most medial point [12]. The raised or indurated area (center) was measured and not the area of the erythema (indicated by the perpendicular lines). A TST reaction  $\geq 10$  mm of the induration was considered positive [13]. All participants underwent a chest radiograph, which was independently read by expert respiratory physician and family medicine specialist in each clinic to exclude active TB.

**Statistical Analysis:** Data was entered and analysed using computerized software statistical package SPSS version 22, with  $p$  values  $<0.05$  regarded as statistically significant. Descriptive statistic such as percentage, mean and standard deviation for each variable was calculated to describe frequencies and percentage for categorical variables while mean and standard deviation was presented for numerical variables. To determine associated factors of TST positivity, a multivariable logistic regression model was then constructed to adjust for occupation, monthly income, smoking status, history of TB contact, and any other variable that reached a  $p$ -value of less than 0.25 in the univariable analysis.

## RESULTS AND DISCUSSIONS

**Socio-demographic participants:** Figure 1 described the sampling for the study. A total of 362 diabetic patients were tested. Mean age of the participants was 59, majority (86%) were  $\geq 50$  years (Table 1). Majority were female (64.1%), and married (86.2%), 42.9% were secondary level of education, and majority (54.7%) were unemployed. Self-report of smoking (6.9%) and history of TB contact (12.2%) was relatively low. Majority of the participants (76.2%) were obese, 76.2% had hypertension, 85.7% had hyperlipidaemia while only 4.5% had asthma and 2.2% had rheumatoid arthritis.

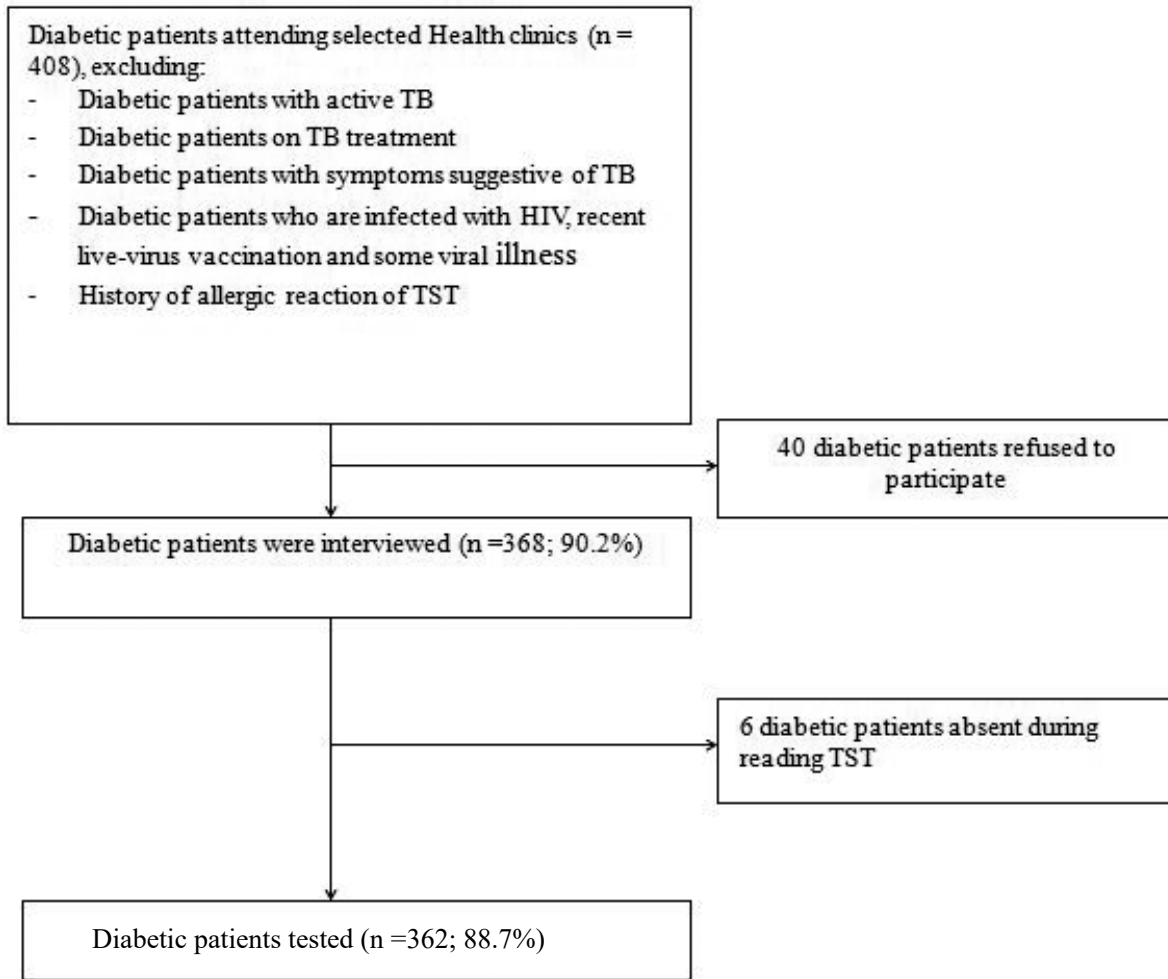


Fig. 1: The enrolment process of diabetic patients in the study

Table 1: Characteristic of Non-diabetic related factors with positive and negative TST results (n = 362)

Variables	TST Negative n (row %)	TST Positive n (row %)	Total n (column %)	Mean (SD)
<b>Age</b>				
< 50 Years Old	49 (14.4)	3 (14.3)	52 (14.4)	59.21 (9.01)
≥ 50 Years Old	292 (85.6)	18 (85.7)	310 (85.6)	
<b>Gender</b>				
Male	121 (35.5)	9 (42.9)	130 (35.9)	
Female	220 (64.5)	12 (57.1)	232 (64.1)	
<b>Ethnicity</b>				
Malay	340 (99.7)	21 (100.0)	361 (99.7)	
Chinese	1 (0.3)	-	1 (0.3)	
<b>Marital Status</b>				
Single	8 (2.3)	-	8 (2.2)	
Married	294 (86.2)	18 (85.7)	312 (86.2)	
Divorced	8 (2.3)	2 (9.5)	10 (2.8)	
Widowed	31 (9.1)	1 (4.8)	32 (8.8)	

Conted...

<b>Highest educational level</b>				
No Formal Education	28 (8.2)	1 (4.8)	29 (8)	
Primary	133 (39.0)	5 (23.8)	138 (38.1)	
Secondary	145 (42.5)	9 (42.9)	154 (42.5)	
Diploma Degree	32 (9.4)	6 (28.6)	38 (10.5)	
Master PhD	3 (0.9)	-	3 (0.8)	
<b>Household Monthly Income (RM)</b>				
<3000	275 (80.6)	17 (81.0)	292 (80.7)	1976.27 (3179.4)
≥3000	66 (19.4)	4 (19.0)	70 (19.3)	
<b>Occupation</b>				
Not Working	192 (56.3)	6 (28.6)	198 (54.7)	
Healthcare Worker	29 (8.5)	7 (33.3)	36 (9.9)	
Non-Healthcare Worker	120 (35.2)	8 (38.1)	128 (35.4)	
<b>Smoking Status</b>				
No	320 (93.8)	17 (81.0)	337 (93.1)	
Yes	21 (6.2)	4 (19.0)	25 (6.9)	
<b>History Contact with TB patient</b>				
No	306 (89.7)	12 (57.1)	318 (87.8)	
Yes	35 (10.3)	9 (42.9)	44 (12.2)	
<b>Obesity</b>				
No	98 (28.7)	25 (23.8)	103 (28.5)	
Yes	243 (71.3)	16 (76.2)	259 (71.5)	
<b>Hypertension</b>				
No	81 (23.8)	4 (19.0)	85 (23.5)	
Yes	260 (76.2)	17 (81.0)	277 (76.5)	
<b>Hyperlipidemia</b>				
No	80 (23.5)	3 (14.3)	83 (22.9)	
Yes	261 (76.5)	18 (85.7)	279 (77.1)	
<b>Bronchial Asthma</b>				
No	334 (97.9)	19 (90.5)	353 (97.5)	
Yes	7 (2.1)	2 (9.5)	9 (2.5)	
<b>Rheumatoid Arthritis</b>				
No	333 (97.7)	21 (100.0)	354 (97.8)	
Yes	8 (2.3)	-	8 (2.2)	

Abbreviations: TST, Tuberculin Skin Test

**Table 2: Characteristic of Diabetic related factors with positive and negative TST results (n = 362)**

Variables	TST Negative n (row %)	TST Positive n (row %)	Total n (column %)	Mean (SD)
<b>Duration of Diabetes in Years</b>				
<10 years	250 (73.3)	14 (66.7)	264 (72.9)	7.26 (5.28)
≥10 Years	91 (26.7)	7 (33.3)	98 (27.1)	

Conted...

<b>Types of Medication</b>				
Diabetic Oral Medication	203 (59.5)	15 (71.4)	218 (60.2)	
Insulin Therapy	22 (6.5)	-	22 (6.1)	
Both	116 (34.0)	6 (28.6)	122 (33.7)	
<b>HbA1c Levels for the last 1 year</b>				
< 6.5%	94 (27.6)	1 (4.8)	95 (26.2)	8.28 (2.20)
≥ 6.5%	247 (72.4)	20 (95.2)	267 (73.8)	
<b>Microvascular complications:</b>				
Retinopathy				
No	243 (71.3)	17 (81.0)	260 (71.8)	
Yes	98 (28.7)	4 (19.0)	102 (28.2)	
Neuropathy				
No	224 (65.7)	11 (52.4)	235 (64.9)	
Yes	117 (34.3)	10 (47.6)	127 (35.1)	
Nephropathy				
No	207 (60.7)	18 (85.7)	225 (62.2)	
Yes	134 (39.3)	3 (14.3)	137 (37.8)	
<b>Macrovascular complications:</b>				
Coronary Heart Disease				
No	324 (95.0)	19 (90.5)	343 (94.8)	
Yes	17 (5.0)	2 (9.5)	19 (5.2)	
Stroke				
No	332 (97.4)	20 (95.2)	352 (97.2)	
Yes	9 (2.6)	1 (4.8)	10 (2.8)	
Peripheral Vascular Disease				
No	329 (96.5)	21 (100.0)	350 (96.7)	
Yes	12 (3.5)	-	12 (3.3)	

Abbreviations: TST, Tuberculin Skin Test; HbA1c. Glycated Hemoglobin

**Table 3: Associated factors of Latent Tuberculosis Infection (LTBI) by simple and multiple logistic regression models**

Variable	Simple Logistic Regression			Multiple Logistic Regression		
	b	Crude OR (95% CI)	p	b	Adjusted OR (95% CI)	p
HbA1C	2.03	7.61 (1.01, 57.51)	0.049	2.66	14.03 (1.63, 213.99)	0.016
Smoking Status	1.27	3.59 (2.31, 74.54)	0.033	1.33	3.78 (1.02, 13.98)	0.046
History of TB Contact	1.88	6.56 (3.07, 69.60)	<0.001	1.94	6.92 (2.56, 18.78)	<0.001
Asthma	1.61	5.02 (0.05, 1.18)	0.053	1.76	5.79 (0.02, 1.39)	0.049

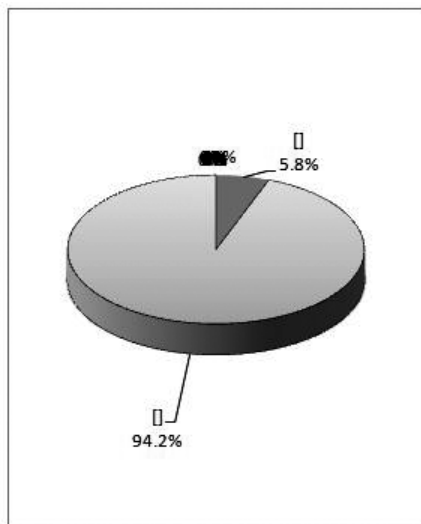
<sup>a</sup> Forward LR Multiple Logistic Regression model was applied

Multicollinearity and interaction term were checked and not found

Classification table (overall correctly classified percentage= 94.2%, which is >70%) and area under ROC curve (98.6%) were applied to check the model fitness.

**Diabetes Profile:** Overall, 72.9% of the 362 participants with TST result were  $\geq 10$  years of having diabetes and 60.2% were taking diabetic oral medication. For microvascular complications, only 28.2 % were retinopathy, 35.1 % were neuropathy and 14.3 % were nephropathy. Then, for macrovascular complications, only 5.2% were coronary heart disease, 2.8% were stroke and 3.3 % were peripheral vascular disease (Table 2).

**Prevalence of LTBI:** The prevalence of LTBI in diabetic patients was only 5.8% (Fig. 2).



**Fig. 2: Prevalence of LTBI among Diabetic Patients (n = 133)**

**Factors associated with LTBI:** In univariable analysis, smoking status, history of TB contact and HbA1C level had significant association with TST positivity.

Multivariable logistic regression showed the smoking status, history of TB contact, HbA1C level and presence of asthma were independently associated with a diagnosis of LTBI (Table 3). Those actively smoking had a 3.78 higher odds for LTBI, while those with history of TB contact had 6.92 higher odds for LTBI and asthma patients had 5.79 times higher odds. The highest odds to have LTBI were the patients with HbA1C  $\geq 6.5\%$  where they were at 14.23 times higher odds to have LTBI.

In this study, the prevalence of LTBI among diabetic patients was only 5.8% (21/362). The result indicated that the tendency for diabetic patients in urban health clinics to have LTBI is low. This is in contrast to the higher prevalence in the study by Swarna Nantha *et al.* [14] which found 28.5% diabetic patients to have positive TST.

It is found in this study that diabetic patients who were active smokers, asthmatics and those with history of

TB contact had high risk to get LTBI than other diabetic patients. In our study, being an active smoker was significantly associated with LTBI ( $p=0.046$ ) where they were 3.78 times at higher odds to have LTBI compared to non-smokers. This is in agreement with the results of previous studies which stated that smoking cause disturbed cilia function thus increased susceptibility to LTBI [10]. Many studies have proved that smokers were at increased risk of developing LTBI and increasing the reactivation of LTBI into active TB [15]. The new finding of association of LTBI with asthmatics need to further evaluation as it is yet clear of its cause.

Usually, healthcare workers especially those who handle a diagnostic test of active TB patients have higher risk to have LTBI as compared to non-healthcare workers (HCWs) [20, 21]. A study of Nasehi *et al* in Iran found 24.38% (95% CI, 21.31 to 27.74) the prevalence of LTBI among HCWs act as TB laboratory staff, higher than other HCWs such as administrative staff, financial staff and service personnel (14.82%, 95% CI, 11.31 to 19.20) [22]. It was also found that longer length of employment as HCWs also increase the risk of LTBI [23]. In our study, a higher proportion of healthcare workers developed LTBI compared to those who were not healthcare workers (Table 2). However, this was statistically insignificant ( $p=0.148$ ). This unexpected but welcoming finding may be the fruit of careful application of personal protective equipment such as proper facemask while handling specimens or during interaction with patients.

Household TB contact increased the risk of TST positivity in previous studies [16, 17]. Likewise, the result of current study showed that household contact significantly associated risk factor of LTBI ( $p<0.001$ ). These are factors other their diabetes profile that need to be taken into account when considering infection with tuberculosis.

Several previous studies showed that men had more tendencies to have LTBI than women [15, 16, 18, 19]. However in our study, there was no significant association between gender and LTBI.

The factor which had the highest increase in odds to have LTBI was having HbA1C  $\geq 6.5\%$ . This finding was not commonly found in previous studies but simply highlights that the importance of blood glucose control could never be overemphasized in preventing complications in diabetes, specifically infections such as tuberculosis.



**Strength and limitations:** The strength of this study is that it provides a current prevalence of LTBI among diabetic patients attending urban health clinics in Terengganu. Another unique feature of this study is that it had adequate sample to demonstrate that the diabetic patients with higher HbA1C and other factors such as smoker, asthma and had history of TB contact has higher tendency to have LTBI than other diabetic patients.

The major limitation of our study is related to the cross-sectional nature of the study which can only find associated factors rather than actual risk factors. Therefore, further prospective studies are needed to gain more insight into the risk factors of incidence of latent tuberculosis and development of active tuberculosis in diabetics.

### CONCLUSIONS

In conclusion, this study revealed that the associated factors for LTBI were having higher glycated haemoglobin (HbA1c), smoking, asthma and history of TB contact. Active screening, infection control measures and glucose controls are recommended in reducing the risk of LTBI and reactivation of LTBI. It also provided updated estimates of LTBI among diabetic patient in Terengganu to help guide control programs. Further study regarding development LTBI into active TB among diabetic patient should be conducted.

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**Conflict of Interest:** There was no conflict of interest in the authors.

**Ethical Clearance:** The study was approved by the human research ethics committee of the faculty of medicine at the Universiti Sultan Zainal Abidin and Medical Research and Ethic Committee (NMRR-16-1937-30162). Participation in the study was entirely voluntary and written informed consent was obtained before data collection and administered TST test.

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# Santri Perception on the Lesbian Gay Biseksual and Transgender Phenomenon a Study in Pondok Pesantren Nurul Mursyd Semarang

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## ABSTRACT

**Introduction:** LGBT should be banned by the Indonesian government for harming health as well as incompatible with Islamic perspective. The Country must protect its citizens from this perverse behavior that contributes to the greatest number of HIV/AIDS cases. Pondok Pesantren is like a dormitory, which also prone to LGBT behavior. The purpose of this study was to analyze the characteristics and perceptions of students about the phenomenon of LGBT with their sexual experience.

**Method:** The study design was observational with cross sectional approach. The population was 35 students and the sample were 25 people. The inclusion criteria of santri is baligh. Quantitative data were collected through self-administered tool. The analysis were univariate and bivariate. The research has received ethical clearance approval No.270/EC/FKM/2016 dated December 20, 2016.

**Results:** The majority of students aged 15-19 years old (68%), with female santri (58%) more than male (42%). Most were in high school (52%). Perceived Susceptibility, perceived seriousness and perceived of benefits and barriers in high category with the percentage of 60%, 56% and 80%, while Cues to action in low category (72%). There were 28% of santri who have sexual experience. There was no relationship to all perceptual independent variables on sexual experience of santri.

**Conclusion:** All santri were categorized as teenagers and most of them have high school education. Few santri have had sexual experience. Perceptions of Susceptibility, seriousness and Perceptions of benefits and barriers had high categories, but cues to action had low categories.

**Keywords:** *santri, perception, LGBT*

## INTRODUCTION

LGBT should be banned by the Indonesian government because it leads to health problems and are not in accordance with Islamic teachings. LGBT contribute the most cases of HIV/AIDS.

Pondok Pesantren is an educational place where the students are all moslem (called santri), they live together in a dormitory and study together under the guidance of Kyai (moslem teacher). Pondok Pesantren is also vulnerable to LGBT behavior because santri live with same sex and are not allowed to be with different sex.<sup>13</sup>

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LGBT invaded Indonesia through academic, political and social aspects. Academically, the spread of LGBT ideas took cover behind academic studies. Many LGBT organizations are practicing on campuses and calling for LGBT ideas through writing. They politically engage in political movements such as action, trying to influence various political policies and cooperate with various institutions, especially those who engaged in advocacy and human rights. Socially, LGBT propaganda is called in various ways and means. Through organizations that concerned about AIDS, they carried out advocacy and consultation, making film, action on the ground, culture, mass media and so on. The spread of LGBT ideas and behaviors under the pretext of freedom and human rights. LGBT is justified by the idea of truth and moral relativity.

LGBT behavior can be imitated by others. If the propaganda and LGBT movements are allowed then the deviant behavior can spread to the community. It should be stated that LGBT is a behavioral aberration.<sup>1,2</sup>

Based on midline 2013, conducted by Puska Gender and UI Sexuality in Jombang, Banyuwangi and Lamongan city, it is known that there are teenage problems about sexual and reproductive health, one of them is about coercion or sexual violence. As much as 21.1% of respondents claimed to have been touched in certain parts without desired. It was 61.5% done by a friend of theirs, and the remaining 38.5% done by boyfriend/girlfriend. This was experienced by male and female students.

Pondok Pesantren also has some various reproductive and sexual health problems, such as cases of sexual intercourse with same-sex santri. There is an activity called '*nyuluh*' which means rubbing the penis between the thighs of a male santri while sleeping.<sup>3</sup>

Santri is disciplined with time table activity and tight studying environment. Factors that are considered underlying sexual behavior '*dalaq*' in pesantren is the homogeneity of interaction, the new santri, and the prohibition and punishment for santri who interact between sex. And also power which are scattered in relations and regulations.<sup>4</sup>

*Mairil* is described as a woman while the perpetrator is called *warok*. *Nyempet* is a sexual activity conducted by *santri* (same-sex) to vent their sexual desire. This activity is done with or no coercion. Santri begin this activity at the age of 13-17 years, due to a homogeneous

environment (all male). *Nyempet* activity performed at night, in the room, and they assume there will be no harm from the health side, if they perform sex only by rubbing the penis between the thighs, without putting it into the anus.<sup>5</sup>

In the study of Reproductive Health Survey in Semarang city in 2014, from 475 respondents santri obtained results as follows:

Most of the samples were 15-19 years old (65.9%), coming from rural (73.1%), consist of 40.6% male and 59.4% female. The education of santri's parents, both father and mother is secondary education (SMP, SMA) working as non civil servant (90%), with low average income (Rp 1,209,000/month). Family, school, community and media have not contributed enough for santri in the aspect of giving reproductive health information. Mother (57.1%), father (29.9%) and siblings (31.8%) talked about reproduction in the family. In school, some friends (51.6%) and teachers (37.5%) discussed it, whereas in the community, some health workers (30.5%) and religious leaders (25.3%) talked about it. Santri who claimed to have a girlfriend (50.5%), perform activities such as holding hands (58.3%), kissing lips (25%) and feeling/stimulating partner (16.7%). The reason of a small group of santri who agree to premarital sex (9%) were sexual intercourse just happen, being forced by a partner or they were curious to try. This group does not consider that female and male virginity are important when they are married. Santri who claimed to have sex (10.74%), admitted to perform for the first time in the age range <15 years to 17 years (50.99%). All of them stated that they used condoms during the first sexual intercourse, but 21.57% admitted to not using condoms during the last sex.<sup>6</sup>

Adolescence is an important stage because it is a transitional period from children to adult. Various problems and changes in physical, biological, psychological and social, could be faced by adolescents in the course of their lives toward adulthood. Within those days, they are still the responsibility of parents and other adults in the community until they are mature and independent.<sup>7</sup>

Human behavior is influenced by one's own perception of something. Perception is always unique in each individual. Perception of a health problem, can be the same, can also be different depends on internal and external factors. Perception is not the passive reception

of gestures, but is shaped by learning process, memory, hope, and attention.<sup>8</sup> Similarly, santri in response to social phenomena such as LGBT rampant. They respond actively to the social background of the demographics they have and experienced during their journey of life, through sight, smell, hearing, touch, and selective tasting. The santri response about LGBT was approached with the theory of health beliefs models, which include the variables such as perceived susceptibility, perceived seriousness, benefit and barrier, and cues to action. The purpose of this study was to analyze the characteristics and perceptions of santri about LGBT phenomena related to their sexual experiences.

**METHOD**

This research was held in Pondok Pesantren Nurul Mursyd which located in Mangunharjo Village, Tembalang District, Semarang. The research design was observational with cross sectional approach.<sup>9</sup> The population was 35 santri with 25 samples. The inclusion criteria of santri are *baligh*. Quantitative data were collected through self-administered questionnaires, and analyzed the univariate and bivariate<sup>10,11</sup>.

**RESULTS AND DISCUSSION**

The majority of santri are aged 15-19 years (68%), with female santri (58%) more than male (42%). Most are in high school (52%). Perceived susceptibility, perceived seriousness and perception of benefits and barriers in high category were 60%, 56% and 80%, while cues to action on low category was 72%. There are 28% of santri who have sexual experience. There is no relationship to all perceptual independent variables on sexual experience of santri.

All santri were categorized as teenagers (young people) with equal numbers of men and women and most of them were in high school education.

**Table 1: Sexual Experience**

No.	Sexual Experience	F	%
1.	Never	18	72.0
2.	Ever	7	28.0
Total		25	100.0

Table 1 showed that there were santri who have sexual experience, although they do not disclose the type of sexual experience that has ever been conducted. Eventhough the percentage of those who had sexual experience is small (28%), it should be interpreted as iceberg phenomenon. It is small on the surface, but the bottom is very large. This finding indicates that the boarding school should begin to provide reproductive health education to the santri. The reproductive health education will aimed to give knowledge and build positive attitude toward sexual and reproductive health. Therefore it could also prevent same-sex sexual activity, or even premarital sex. Aritonang in 2015 found that knowledge and attitude are predisposing factors that will motivate someone to act positively or negatively. It was also found that good knowledge and attitude will affect the behavior of premarital sex.<sup>12</sup>

**Table 2: Perceived Susceptibility of Santri**

No.	Perceived Susceptibility	F	(%)
1.	Low	10	40.0
2.	High	15	60.0
Total		25	100.0

Perceived susceptibility and seriousness in the high category, as well as perceived on the benefits and barriers, while the cues to action on the low category.

The expected behavior in this study is that students can prevent themselves from the act of LGBT which could be the trigger of the emergence of HIV/AIDS. Behavior will be achieved or can not be observed through the theory of Health Belief Model.<sup>12</sup>

Their perceived of susceptibility is high because they feel prone to imitate the acts leading to LGBT behavior. Although they have the notion that LGBT behavior is not allowed by religion, they believe that LGBT does not bring harm to the perpetrators and is a phenomenon that will disappear by itself. They also assume that if they or their families are in LGBT nuanced environment they can also imitate the act of LGBT. The surprising thing is that orphanages or boarding schools are also vulnerable to LGBT behaviors.

**Table 3: Perceived Seriousness of Santri on LGBT Behavior**

No.	Perceived Seriousness	F	(%)
1.	Low	11	44.0
2.	High	14	56.0
Total		25	100.0

The perceived seriousness that is in the high category. Most santri expressed that they believed LGBT behavior would suffer tremendous torture in the hereafter, and the culprit would be excommunicated by the community in addition to triggering HIV/AIDS causing future loss and even death. The LGBT will also find it difficult to get a job. But what needs to be underlined is that they believe in the boarding school environment, there are santri who behave like LGBT, one of them is *dalaq* phenomenon in pesantren.<sup>4,5,6</sup>

**Table 4: Perceived of Benefits and Barriers of Santri to LGBT Behavior**

No.	Benefits and Barriers	F	(%)
1.	Low	5	20.0
2.	High	20	80.0
	Total	25	100.0

About the perceived benefits, santri thought that some will have LGBT behavior when they feel peace if the environment is supporting such as giving examples of LGBT behavior and as a means to vent the lust that is difficult to be expressed in their environment. Since Pondok Pesantren teaches Islamic norms, which one of them is forbid premarital sexual activity. But the perceived barrier to LGBT behavior is from family and peer group of santri. This result is supported by the research result from Sidqin in 2017. Sidqin found that the external factors that affect the tendency of becoming LGBT are lack of support from family especially parents, mislead parenting, homogeny environment, and life style. Other research also found that family support on sexual and reproductive health education could prevent children on turning into doing LGBT-related behavior.<sup>14, 15, 16</sup>

However, other research found that peer group among teenagers forms the feeling of simpaty and empathy to their peers. Teenagers tend to develop the feeling of fondness whether to different sex or to same sex. It shows the affection aspect of teenagers is developing very well. However, if teenagers exposed to LGBT-related behavior it will change their perception from the feeling of empathy to feeling of affection or love.<sup>17</sup>

**Table 5: Cues to Action to LGBT Behavior**

No.	Cues to Action	F	(%)
1.	Low	18	72.0
2.	High	7	28.0
	Total	25	100.0

The Cues to Action, santri perceived that they tend not to engage in LGBT behavior because of the prohibition from the religion, family, community leaders, friends, doctors and media who reports.

**Table 6: Recapitulation of bivariate Test Results**

No.	Independent Variable	Dependent Variable	P
1.	Perceived Susceptibility	Sexual experience	0,378 Not related
2.	Perceived Seriousness		0,090 Not related
3.	Perceived benefits and barriers		0,113 Not related
4.	Cues to Action		1,000 Not related

There is no relationship between perceptual independent variables of susceptibility and seriousness as well as from the side of benefits and barriers as well as cues to action with the sexual experience of santri ( $H_0 =$  acceptable). The perception of a person depends on the social background of each individual’s culture, including santri in Pondok Pesantren. The perceptual variable is not the only variable that becomes the determinant of sexual behavior. There are many other determinants of behavior that must be explored to link it to sexual behavior.

### CONCLUSION

All santri are categorized as teenager with the majority is in high school. Few santri have had sexual experience. Perceived susceptibility, perceived seriousness, and perceived benefits and barriers to LGBT behavior were in high categories, whereas cues to action were in low categories.

It is suggested to give education about adolescent reproductive health to santri in Pondok Pesantren so that they are empowered in reproductive health continually in curriculum of Pondok Pesantren. It is also suggested to improve the facilities and personal facilities of students such as santri rooms and also make regulation of reproductive health related behaviors in order to anticipate LGBT behavior.

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**Ethical Clearance:** The research has received ethical clearance approval No.270/EC/FKM/2016 dated December 20, 2016 from Ethics committee Faculty of Public Health University of Diponegoro Semarang

**Competing Interest:** The authors declare that they have no competing interest

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# Factors that Affect the Success of Tuberculosis Therapy in Primary Care: Type of Tb Preliminary Studies

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## ABSTRACT

The incidence of tuberculosis disease is a public health problem, although there are standards of therapy and clinical pathway for TB patients. Complications of TB disease will lead to increase mortality and to decrease quality of life of patients. The effectiveness of drug therapy should be enhanced by developing an educational or counseling model as non-pharmacological treatment of primary care. Preparation of that model start with knowing factors that influence the success of tuberculosis therapy in primary care. This step is needed to make the model effective and in accordance with the service condition. The purpose of this research is to know the factors influencing the success of tuberculosis therapy in primary care as the first step to formulate the intervention model of behavior change of Tuberculosis patients. The study design was a cohort for 4 months with a total of 40 early tuberculosis patients. Data collection was done in primary by interviewing with questionnaire guidance. Secondary data retrieval was conducted to obtain therapeutic data, clinical outcomes, laboratory and radiology. The results showed family support factors, medication adherence, companion to take medication from family and good nutrition intake have an effect on the success of tuberculosis therapy. Tuberculosis pharmacologic therapy should be supplemented with family support, medication adherence, companion taking of family-derived medication and good nutritional intake. The conclusion showed the most patient has pulmo tuberculosis (61.9%), age <50<sup>th</sup> (81%), and woman (52,4%). Mineral (Fosfor) from nutrition intake factors have relationships in tuberculosis therapy ( $p = 0.014$  ;  $p < 0,05$ ).

**Keywords:** Success of therapy, factor, model, primary service

## INTRODUCTION

Tuberculosis is a contagious disease caused by *Mycobacterium Tuberculosis*. Tuberculosis is a disease of global concern. With various control efforts being carried out, the incidence and death due to tuberculosis have decreased, but Tuberculosis is estimated to still attack 9.6 million people and cause 1.2 million deaths in 2014.<sup>1</sup> India, Indonesia and China are countries with the most Tuberculosis sufferers, namely 23%, 10% and 10% of all sufferers in the world.<sup>2</sup> Complications of tuberculosis will lead to increased mortality and decrease the quality of life of patients. The effectiveness of therapy should be enhanced by developing knowledge of the factors that influence the success of tuberculosis therapy. Treatment attendance, family carrying capacity, the role

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of drug guidance, depression and nutritional intake in tuberculosis patients are thought to be associated with successful tuberculosis therapy.

**OBJECTIVE**

Assess the relation of adherence to treatment, family supporting capability, role of drug-taking guides, depression and nutrition with successful tuberculosis therapy

**METHOD**

The study design was a cohort for 4 months with a total of 40 early tuberculosis patients. Data collection was done in primary by interviewing with questionnaire guidance. Secondary data retrieval was conducted to obtain therapeutic data, clinical outcomes, laboratory and radiology. Place of study in polyclinic and clinic treatment center.

**RESULTS AND DISCUSSIONS**

Patient characteristics with the number of frequency and percentage are presented in table 1. Patients without depression and patients with mild depression category had the highest number of all respondents. Almost all patients have good treatment, except for one patient. 19 out of 21 patients who have good family support. Then there were 13 people from 21 people who did not get good medication reminders. For nutritional intake, most patients are still lacking in protein, fat, carbohydrates, vitamin A, and vitamin c. Whereas energy intake in tuberculosis patients is less and normal than 9 people. Mineral phosphorus is dominated by patients with over 8 people.

Based on table 2, description of the condition of tuberculosis patients for HDRS very severe on extrapulmonary tuberculosis of 4.8%. Description of the condition of tuberculosis patients less disobedient category in taking tuberculosis drug in pulmonary tuberculosis of 28.6% and in extrapulmonary tuberculosis of 14.3%. The carrying capacity of less family in pulmonary tuberculosis is 9.5%.

**Table 1: TB Patient characteristics of depression scale, taking medicine, carrying capacity and nutritional intake**

Patient characteristics	Frequency	Percentage
<b>Hamilton Depression Rating Scale</b>		
Normal	9	42.9
Mild	9	42.9

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Moderate	1	4.8
Severe	1	4.8
Very Severe	1	4.8
<b>Treatment Compliance</b>		
Obedient	20	95,2
Disobedient	1	4,8
<b>The carrying capacity of the family</b>		
Positive support	19	90,5
Negative support	2	9,5
<b>Role of supervisor taking medicine</b>		
Good	4	19,0
Bad	13	61,9
None	4	4,8
<b>Nutritional intake</b>		
<b>PROTEIN</b>		
Less	16	76.2
Normal	4	19.0
More	1	4.8
<b>ENERGY</b>		
Less	9	42.9
Normal	9	42.9
More	3	14.3
<b>FAT</b>		
Less	15	71.4
Normal	5	23.8
More	1	4.8
<b>CARBOHYDRATE</b>		
Less	18	85.7
Normal	3	14.3
<b>VITAMIN A</b>		
Less	14	66.7
Normal	3	14.3
More	4	19.0
<b>MINERAL (FOSFOR)</b>		
Less	6	28.6
Normal	7	33.3
More	8	38.1
<b>VITAMIN C</b>		
Less	18	85,7
Normal	3	14,3

**Table 2: The relation of factors that affect the success of TB therapy with the type of TB**

Variable	Type of TB		Σ TB Patient	P	OR
	Pulmonary TB	Extra pulmonary TB			
<b>Hamilton Depression Rating Scale</b>					
Normal	7 (33,3%)	2 (9,5%)	9 (42,8%)	6.010	0.289
Mild	2 (23,8%)	4 (19,0%)	6 (28,6%)		
Moderate		1 (4,8%)	1 (4,8%)		
Severe	1 (4,8%)		1 (4,8%)		
Very Severe		1 (4,8%)	1 (4,8%)		
<b>Treatment Compliance</b>					
Obedient	12 (57.1%)	8 (38.1%)	20 (95,2%)	0.600	0.289
Disobedient	1 (4.8%)		1 (4,8%)		
<b>The carrying capacity of the family</b>					
Positive support	11 (52.4%)	8 (38.1%)	19 (90,5%)	0.579	0.505
Negative support	2 (9.5%)		2 (9,5%)		
<b>Role of supervisor taking medicine</b>					
None	4 (19.0%)		4 (19,0%)	5.467	0.127
Good	6 (28.6%)	7 (33.3%)	13 (61,9%)		
Bad	3 (14.3%)	1 (4.8%)	4 (19,1%)		
<b>Nutritional intake</b>					
<b>PROTEIN</b>					
Less	8 (38.1%)	8 (38.1%)	16 (76,2%)	5.729	0.133
Normal	4 (19%)		4 (19,0%)		
More	1 (4.8%)		1 (4,8%)		
<b>ENERGY</b>					
Less	3 (14.3%)	6 (28.6%)	9 (42,8%)	6.918	0.052
Normal	7 (33.3%)	2 (9.6%)	9 (42,8%)		
More	3 (14.3%)		3 (14,4%)		
<b>FAT</b>					
Less	7 (33.3%)	8 (38.1%)	15 (71,4%)	7.182	0.075
Normal	5 (23.8%)		5 (23,8%)		
More	1 (4.8%)		1 (4,8%)		
<b>CARBOHYDRATE</b>					
Less	10 (47.6%)		18 (85,7%)	0.556	0.257
Normal	3 (14.3%)	8 (38.1%)	3 (14,3%)		
<b>VITAMIN A</b>					
Less	8 (38.1%)	6 (28.6%)	14 (66,7%)	0.471	0.797
Normal	2 (9.5%)	1 (4.8%)	3 (14,3%)		
More	3 (14.3%)	1 (4.8%)	4 (19,0%)		
<b>MINERAL (FOSFOR)</b>					
Less	3 (14.3%)		6 (28,6%)	11.217	0.014
Normal	2 (9.5%)	3 (14.3%)	7 (33,3%)		
More	8 (38.1%)	5 (23.8%)	8 (38,1%)		
<b>VITAMIN C</b>					
Less	10 (47.6%)	8 (38.1%)	18 (85,7%)	0.556	0,257
Normal	3 (14.3%)		3 (14,3%)		

Our study provides evidence that patient with mild depression can be found out in both type of TB, 2 patient for Pulmonary TB, and 4 patient for Extrapulmonary TB. While moderate and very severe depression only found in Extrapulmonary TB (4,8%), and severe depression is only found in Pulmonary TB (4,8%). All of them has odds ratio 0,289, which means depression factors can be affect the type of tuberculosis patient 0,289x more than tuberculosis patient with no depression. Previous studies said TB patients have a high risk of significant depression when compared to the general population.<sup>3</sup> And previous studies have also reported that stigma is often attached to health problems, including tuberculosis. The stigma attached to TB sufferers is like rejection, exclusion, fear of infection or transmission, changes from people with TB.<sup>4</sup> The stigma in tuberculosis can lead into depression and can cause treatment delay and have a negative impact on the continuity of treatment. Negative impacts in treatment continuity may lead to discontinuation of treatment in patients with tuberculosis that may lead to unresolved treatment.<sup>5</sup>

Compliance is an individual's behavior (for example: taking medication, adhering to a diet, or making lifestyle changes) as recommended by therapy and health. The level of compliance can be started from the act of paying attention to every aspect of the recommendation to obeying the plan.<sup>6</sup> Based on table 2, most of patient (95,2%) was obey. Adherence to treatment is behavior that shows the extent to which individuals follow recommendations related to health or disease. Based on the explanation above, it can be concluded that the behavior of adherence to treatment is the extent to which the efforts and behavior of an individual shows conformity with the rules or recommendations provided by health professionals to support his recovery. There are 4 factors that influence patient compliance in undergoing treatment, namely treatment-related factors, patient-related factors, factors related to medical personnel and factors related to health care provider systems. If these four factors synergistically support, the patient's compliance in carrying out the treatment, the therapeutic target of healing can be achieved.<sup>7</sup>

Family support capacity has a role in the success of tuberculosis therapy. The family has a great role in controlling tuberculosis treatment, because the duration of TB treatment is long and must be organized and the patient also needs support in other things such as daily activities, nutritional support, from emotional to

instrumental aspects such as financial support.<sup>8</sup> Long-term treatment and the effects of medication make the patient uncomfortable so that they do not continue treatment, so family support is also needed as a means of treatment compliance.<sup>9</sup>

Families can contribute to contributing to patients in two ways: supporting and caring for patients. Previous research suggests that patients feel support and care should be given directly by the family. The intended support is in the form of assistance in daily routine activities, financial assistance, emotional and moral support, and motivation to complete treatment. Another thing that patients need to be supported is to accompany during treatment, to take and take medication, provide food, and give them time to rest.<sup>10</sup> Family support has a positive effect on nutritional status and adherence to treatment and high family support can increase the likelihood of making the patient's nutritional status better and more obedient in treatment.<sup>11</sup>

The results of the study indicate that work and health services are not a risk factor for treatment behavior for pulmonary TB patients. While the role of PMO, family support and discrimination is a risk factor for treatment behavior for pulmonary TB patients. This means that if the PMO does not carry out its role properly, it can affect the patient's treatment behavior which then has an impact on therapeutic success. Direct treatment supervision is important at least during the intensive treatment phase (first 2 months) to ensure that the drug is eaten with the right combination and the right time period. With direct supervision of treatment, patients do not assume responsibility for compliance with drug use alone.<sup>12</sup> Health care workers, community health workers, the government and the public must all share responsibilities and provide a lot of support to patients to continue and complete their treatment. Treatment supervisors can be anyone who wants, is trained, is responsible, can be accepted by the patient and is responsible for the supervision of tuberculosis treatment.<sup>13</sup>

According to Dorland (2015) nutrition is taking food and burning from food substances that contain nutrients by an organism for survival. Nutritional intake is the amount of food that a person eats in order to obtain energy. As for these foods like carbohydrates, protein, fat. Other names of these nutrients are macro nutrients.<sup>11</sup> The problem of nutrition intake is important because the improvement of nutrition is one of the efforts to

break the transmission and eradication of tuberculosis in Indonesia.<sup>14</sup> Besides that, the lack of macro nutrients will have an effect on Zinc, Vitamin A, Vitamin C, Vitamin D and Mineral deficiency. This lack of micronutrients will result in damage to critical cell immunity to fight tuberculosis.<sup>1</sup>

## CONCLUSION

Adherence to treatment, Family carrying capacity, Role of drug taking guides (PMO), Depression and Nutritional intake related to the success of tuberculosis therapy.

**Conflict of Interest:** The authors declare that they have no conflicts of interest.

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**Ethical Clearance:** The study was approved by Institutional ethics committee

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# Mapping of Tuberculosis (TB) Prevalence in Padang City

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## ABSTRACT

Transmitted TB disease is still a concern of the World because it can attack anyone and anywhere. The prevalence of pulmonary tuberculosis in Padang City increased by 0.18% in 2016. This study aims to obtain a picture and to know whether or not there is a relationship between socio-demographic and environmental variables on the prevalence of Pulmonary TB per sub-district in Padang City. A descriptive analytic study with an ecological study design on secondary data in Padang City Health Office. Data were analyzed by univariate and bivariate using correlation test and linear regression. The result of bivariate analysis showed that the percentage of healthy house and phosphate households was related to the prevalence of Pulmonary TB ( $r = -0.854$ ) and ( $r = -0.607$ ). While the percentage of sex ( $r = 0,103$ ), population density ( $r = 0,185$ ), ratio of health service facility ( $r = -0,061$ ) also have no correlation with prevalence of Pulmonary TB per sub-district in Padang City. Healthy homes and phylogenic households have an influence on the association of socio-demographic and environmental factors with the prevalence of pulmonary tuberculosis. It is expected that the Health Office, Public Health Center and related health agencies can improve the prevention and control of pulmonary TB disease. Approach to the community especially family in the household is one of the right way to reduce the risk of pulmonary tuberculosis in increasing the percentage of healthy house and households behave healthily especially Nanggalo and Bungus sub district in Padang City.

**Keywords:** Ecology, environment, prevalence, socio-demography, Pulmonary TB

## INTRODUCTION

Lung Tuberculosis is an infectious disease caused by Mycobacterium tuberculosis and the second leading cause of death after HIV.<sup>1</sup> TB disease is also the leading cause of death number 5 after cardiovascular disease and airway disease in all age groups and number 1 of the infectious disease class.<sup>2</sup> Data (WHO) 2013 shows an increase in the number of TB infected TB cases by 0.6% in 2014.<sup>3</sup>

Indonesia is ranked fifth with the highest TB burden in the world.<sup>1</sup> TB prevalence rate in Indonesia in 2013 is 0.4% of the population.<sup>4</sup> The prevalence of pulmonary TB in West Sumatra in 2013 is 0.2%. In 2014

the prevalence of TB in West Sumatera is 0.11% and in 2016 the prevalence of Pulmonary TB in West Sumatra has increased to 0.15%. The city of Padang accounts for a high rate of pulmonary TB incidence in West Sumatera Province. The prevalence of pulmonary tuberculosis in Padang City in 2014 is 0.11%. While in 2016 increased to 0.18%. This figure exceeds the prevalence rate of Pulmonary TB in West Sumatera (0.15%)<sup>5-7</sup>

The high prevalence of Pulmonary TB is caused by various risk factors. Some of the risk factors for pulmonary tuberculosis are socioeconomic factors, demography, environmental health and behavioral factors. Research conducted by Rukmini,

That there are several risk factors for pulmonary tuberculosis, such as age, sex, job status, nutritional status, physical condition of the house. This is supported by research conducted by Jendra in Wori Sub district which states that age, sex, and occupancy density are risk factors for pulmonary tuberculosis. The Sylva Lestari study in Lampung also showed that the population density and Health Behavior related to the occurrence of Lung TB<sup>6-10</sup>

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Study of Chandra Wibowo found that in men get pulmonary TB In case of contact 0, 36 times in women. This study also confirmed that the density of the population is related to the incidence of tuberculosis in Lampung Province and in line with Deska Adi's research which says that there is a relationship of clean and healthy life behavior with the incidence of Pulmonary Tuberculosis (0.002)<sup>11-13</sup>

Padang City is the capital of Sumatera Province West. Padang City has the largest population of 914,968 people. Population density in Padang City is 11316 people / km<sup>2</sup>. Padang City consists of 11 districts and 104 sub-districts. The total number of houses in Padang City is 176,745 units, while the number of households recorded is 199,704. The number of health service facilities in Padang City is 29 units of hospital, 22 units of health center, and 62 Health Center auxiliary<sup>7</sup>

Research on pulmonary tuberculosis has been done by previous researcher. But the research of Pulmonary TB using ecology is still little done especially in Padang City. Ecological studies are epidemiological studies with populations as units of analysis, aimed at describing the correlative relationship between the disease and the factors of interest of the researcher can determine whether or not the relationship and where the relationship is (positive / negative). So that the researcher can directly find the existence of relationships and the level of relationship variables that are reflected in correlation coefficient<sup>14-15</sup>

Previous research on Pulmonary TB has been done in the city of Padang. As research conducted by Shabrina about the risk of TB in the work area of Andalas Health Center in Padang City using case control design<sup>16</sup> While research of Pulmonary TB with cross sectional design also done by Ivan Putra in the same place<sup>17</sup>. Some studies that have been done in Padang City generally discuss at the individual level, for the population level is still rarely done. Research with ecological approach needs to be done in Padang City because, suspected that demographic condition and environmental condition of Padang city at risk for the happening of Pulmonary TB. Through the ecological approach is expected. This study can be a broader policy input in the process of preventing and promoting the incidence of Pulmonary TB in the city of Padang.

## METHOD

This study uses an ecological study design. Ecological studies were used to examine the relationship between socio-demographic and environmental factors on the prevalence of pulmonary tuberculosis in Padang City. The population in this study is all sub-districts contained in Padang Municipality

Secondary data on the incidence of TB disease per sub-district was measured by document review. Reports and recapitulation data of Lung TB prevalence in Padang City Health Office is used as a measuring tool. Secondary data on socio-demographic and environmental factors on lung tuberculosis prevalence consisting of age, sex, population density, and healthy house, Health Behavior and health facilities were obtained from data recording of Health Office of Padang. The results of recording and recapitulation of the data used as a measuring tool.

## RESULTS AND DISCUSSIONS

**Table Bivariate Analysis**

Variabel	r	R <sup>2</sup>	p value
% Sex	0,103	0,011	0,763
% population density	0,185	0,034	0,587
% healthy home	-0,635	0,404	0,036
% Households behave healthily	-0,607	0,368	0,048
Ration of Health Facilities	-0,061	0,004	0,859

Based on the analysis of the correlation between relationship socio-demographic and environmental factors on the prevalence of pulmonary tuberculosis revealed that there was no significant relationship between male sex percentage and TB prevalence ( $p = 0.763$ ), had weak strength ( $r = 0.103$ ) with positive direction. There was no significant association between population density and lung TB prevalence ( $p = 0.587$ ), had weak strength ( $r = 0.185$ ). There is a significant correlation between percentage of healthy house with prevalence of Pulmonary TB ( $p = 0.036$ ), has strong strength ( $r = -0.635$ ) with negative direction. There was a significant correlation between percentage of Households behave healthily with prevalence of Pulmonary TB ( $p = 0.048$ ), had strong strength ( $r = -0.607$ ) with negative direction. There is no significant relationship between the ratio of health care facilities and the prevalence of pulmonary tuberculosis ( $p = -0.859$ ).

## CONCLUSIONS

**Percentage of male gender:** The study is in line with Demsa stating that there is no relationship between sex and Tuberculosis occurrence (p value = 0.115)<sup>18</sup>. The study conducted by Merryani also states there is no relationship between sex with Tuberculosis incidence (p value = 0.201).<sup>19</sup>

Sex is one of the risk factors for pulmonary TB. In the world of TB Lung a lot of men. Pulmonary tuberculosis is more prevalent in males than in females as males mostly have smoking habits making it easier to contract pulmonary TB<sup>20</sup>

According to the researchers' assumptions, there is no significant relationship between the percentage of male sex and the prevalence of pulmonary TB due to males men generally work outdoors to meet the needs of their families, whereas most women live in homes as housewives. That way more women spend time at home and that causes the risk to contract TB more. In the house contact with people with Pulmonary TB directly and often. This is what causes the risk of women suffering from Lung TB greater than men. In addition, because of the close contact relationship that plays a role because the longer the contacts, the more risky to catch TB germs.

**Population density:** This study is in line with research conducted by Dyah research which states that there is no relationship between population density and lung TB prevalence (p value = 0.97).<sup>21</sup>

Basically, population density has an effect on the occurrence of Pulmonary TB people susceptible to exposure to infectious pulmonary TB patients are higher in densely populated areas. The greater the community, the greater the range of health problems and the greater the number of health resources. And these resources are often needed because infectious diseases can spread more rapidly and environmental problems are often more severe in densely populated areas.<sup>22</sup>

These results indicate that there is no significant relationship between population density and lung TB prevalence because the population density is not always more frequent contact occurs more often. Residential density at home is more risky because at home contacts occur directly and often. Pulmonary TB transmission

will be easy to occur even from parent to child or from one family member to another. The increased time associated with the patient is likely to be infected by the growing contact. The level of contact relationships is very important because the longer the contacts, the more risky to catch TB germs. The closeness of contacts is seen from household contacts and contacts outside the home. From the results of the study found significant differences in risk between population densities with contacts outside the home.

**Percentage of healthy house:** The study is in line with research conducted by Demsa's research which states that there is a relationship between room occupancy density and incidence of Pulmonary TB (p = 0,005)<sup>18</sup> and there is also a relationship between ventilation area and pulmonary TB incidence (p = 0,008). In research Ryana also stated that there is correlation between lighting with Tuberculosis incidence (p = 0,025), and there is relationship between ventilation area with Tuberculosis event (p = 0,005)<sup>23</sup>

In theory from some of the indicators one of the important healthy house requirement is density dwelling. The density of the inhabitants of the house can affect health, because if a dwelling house is densely populated it may allow the transmission of the disease from one human being to another. The excessive density of occupants in the room will have an effect on the development of the seeds of the disease in the room. Householder density is one factor that can increase the incidence of pulmonary tuberculosis and other infectious diseases.<sup>9</sup>

Ventilation and lighting in the home are also factors related to the occurrence of pulmonary tuberculosis. Eligible room ventilation allows for a change of air in the room, thereby reducing the likelihood of transmission to others as the germ concentration decreases.

A room with an inadequate ventilation area causes germs always in high concentration, thus increasing the likelihood of transmission to others. Inadequate ventilation causes inadequate airflow so that indoor air humidity rises and this condition becomes a good medium for the development of pathogens. The entry of sunlight into the house is expected to kill the TB germs released by the patient at the time of cough, so the number of germs in the house can be reduced and transmission is also reduced.

**Percentage of households with Health Behavior:** The study is in line with research conducted by Deska who said that there is a relationship of clean and healthy life behavior with the incidence of Pulmonary Tuberculosis (0.002)<sup>13</sup>

In theory, some indicators in Health behavior affect the occurrence of Pulmonary TB, such as clean water, fruit and vegetables and not smoking in the house. The behavior of people who still do not use clean water will cause disease. The existence of the disease will reduce the body's immunity so that other disease will also be easy to attack, one of which is Pulmonary TB. Likewise for consumption of fruits and vegetables which are indicators in Health Behavior to improve nutritional status in the household. With the fulfillment of nutrient status then it will increase the body immunity which then can reduce the risk of lung tuberculosis. No smoking in the home is the most important indicator in reducing the risk of TB infection. Those who smoked 3 to 4 times more positive test, which means 3 to 4 times more infected with pulmonary tuberculosis than non-smokers<sup>18</sup>

**Ratio of health care facilities:** This research is in line with research conducted by Herri in Malang stating that there is no relation between health service facilities and the incidence of Pulmonary TB (p value = 0,11)<sup>24</sup>

Availability of health service facility is one of important factor in Lung TB prevention. However, according to the researcher's assumption, there is no relationship between the ratio of health facilities and the prevalence of pulmonary tuberculosis because in addition to the amount, other factors such as access to health service facilities and public knowledge about the existence of health service facilities can also affect the prevalence of pulmonary TB.

Rural areas are high the incidence of TB is high due to the distance factor to the health service facilities, also because of the lack of knowledge for the utilization of health service facilities and also economic problems so prefer not to seek medical facilities and prefer the traditional way. In the city of Padang for health care facilities such as health centers and hospitals are already available well, maybe only the spread is not evenly distributed. But it does not matter because the distance traveled to the health facilities means not too far away. Therefore, in this study, the ratio of health center and hospital ratios have no correlation with the prevalence of pulmonary tuberculosis.

## CONCLUSIONS

Nanggalo Sub-district is the highest prevalence of pulmonary TB in 2016. The percentage of male sex, population density and ratio of health service facilities have no correlation to the prevalence of pulmonary tuberculosis in Padang City. While the percentage of healthy homes and households with health behavior has a strong power relationship with a negative direction toward the prevalence of pulmonary tuberculosis.

The Padang health office is expected to conduct cross-sectoral cooperation with the Central Bureau of Statistics of the city of Padang and the department of public works and public housing related to the distribution of healthy homes and households with healthy and clean behaviors in an effort to reduce the risk of tuberculosis.

The Public Health Center is expected to improve tuberculosis prevention and control, by approaching households to improve knowledge and understanding of the importance of healthy living behaviors.

The health office along with the public health center can provide counseling to the community to reduce the increase of lung TB in Padang city, especially to the community in the area with high lung TB prevalence and risky environmental conditions.

The health department can also disseminate information media such as leaflets, posters, etc., so that all walks of life can be touched with information about pulmonary TB.

**Conflict of Interest:** There is no conflict of interest in this research

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**Ethical Clearance:** This study uses secondary data obtained from monthly report on disease control and prevention section in the Padang City Health Office in 2016. So the ethical clearance for this research is excluded from the research requirements.

Research permission is obtained from Health Office.



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# History of Children and Malnutrition Status in Magetan

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## ABSTRACT

Malnutrition status in infants will give the long-term impact for the growth of children under five in the future. Family factors, history of the disease, and birth history of infants may affect the current nutritional status of children under five. The purpose of this study was to analyze the history of LBW, history of infectious disease, early breastfeeding, the number of families, and maternal education with the incidence of malnutrition status in toddlers in Magetan, Indonesia. The research method is observational with a case-control approach. The respondents of this study were mothers of children aged 6-60 months with malnutrition status of 54 toddlers as case group. The comparison of case and control respondents is 1:1. Chi-square test was used to analyze research data with 95% significance level ( $\alpha = 0,05$ ). The results showed that there was a correlation between the history of LBW ( $p = 0.045$ ; OR = 2.152; 95% CI = 1.008-4.595, infectious disease ( $p = 0,000$ ; OR = 10,000; 95% CI = 4.405-22,703), early complementary feeding ( $P = 0,004$ ; OR = 2,696; 95% CI = 1,371-5,301); and mother education ( $p = 0,000$ ; OR = 4,796; 95% CI = CI = 1,986-11,579) with the incidence of malnutrition status in toddlers in Magetan. Education of nutritious food intake, besides the given of exclusive breastfeeding and complementary feeding in right time able to increase the nutritional status of children and reduce the incidence of LBW and infectious diseases.

**Keywords:** *Low-birth weight, disease, complementary feeding, education*

## INTRODUCTION

Good nutrition for babies and toddlers early in life has a long-term impact. Children will get optimal growth and reduce the risk of many diseases. Poor nutrition becomes the determinant factor of obesity and non-infectious diseases at the time of entering adulthood<sup>1</sup>. In addition, malnutrition causes the occurrence of 2.2 million deaths in children aged less than 5 years<sup>2</sup>. Almost 40% of children under five age suffer from loss of developmental potential caused by stunting. The reduction of stunting could have significant impacts for children and human capital potential.

UNICEF notes that in 2011, it is estimated that about 15% of the 20 million babies born have low birth weight<sup>4</sup>. Appropriate feeding can reduce the incidence of stunting

rapidly. Provision of early complementary feeding (ECF) in infants (<6 months) leads to unsuccessful exclusive breastfeeding. Only about 39% of infants (<6 months) exclusively breastfed<sup>5</sup>. Family with low economic status allows pregnant mother intake in less nutritious. It can make the mother has a low weight as the risk for low birth weight babies (RR = 2.3, 95% CI 1.4-3.8)<sup>6</sup>. They have a significant increase to deliver babies with low birth weight<sup>7</sup>. Monitoring of malnutrition cases needs to be considered for community nutrition improvement decision making.

East Java Provincial Health Office in Indonesia in 2012 recorded the prevalence of malnutrition during 2010-2012 period continued to increase, that is 7,760 cases (0.33%) (2010), 8,410 cases (0.34%) (2011), and 11,056 cases (0.35%) (2012). Magetan regency is one of the districts whose case of malnutrition is fluctuating. The number of children under five who were weighed about 36,270 (2013), identified by 354 (0.98%) nutritional status, 34,487 (95,08%) good nutrition, less than 1.378 (3.80%) and malnutrition 205 (0.57%). Prevalence of malnutrition in the period 2012-2014 also experienced

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fluctuation, that is 112 cases (0,24%) (2012), 205 cases (0,45%) (2013), and 184 cases (0,41%) (2014). Primary health care of Karangrejo in Magetan has the highest prevalence of malnutrition in the period 2012-2016, ie 18 cases (1.3%) (2012), 31 cases (2.9%) (2013), 32 cases (2.5%) (2014 ), 26 cases (1.6%) (2015), and 16 cases (1.02%) (2016). Cases of malnutrition at Primary Health Care of Panekan were ranked fourth, but the number of under-five children under the Red Line (BGM) and Low Birth Weight (LBW) cases was highest. The prevalence of malnutrition in primary health care is also quite high, ie 11 cases (0.30%) (2013), 14 cases (0.39%) (2014), 22 cases (0.65%) (2015), and 26 cases (0.78) (2016). This study aims to analyze the relationship of toddler conditions (history of LBW, history of infectious disease, early complementary feeding), the number of families, and maternal education with the incidence of malnutrition status in toddlers in Magetan, East Java.

**METHOD**

This case-control study was conducted on 54 mothers with toddlers (6-59 months) of malnutrition status as case group and 108 mothers with toddlers (6-59 months) good nutritional status as a control group. This research was conducted in May 2016 in Panekan Subdistrict, and Karangrejo Subdistrict, Magetan Regency, Indonesia. The sample selection used with fixed disease sampling for case group and purposive sampling for a control group based on inclusion and exclusion criteria. Inclusion criteria are toddlers with nutritional status either based on the medical record of Panekan and Karangrejo Health Center. Exclusion criteria are the mother of a toddler has died. The data was collected by researchers assisted by four enumerators who are public health students. Enumerator training is conducted before data collection activities.

Information on the history of LBW, the provision of MP-ASI, infectious diseases, the number of family members, and maternal education were obtained through interviews using structured questionnaires. Toddlers are categorized as ‘LBW’ if the birth weight is ≤2500 g or ‘not LBW if the birth weight is > 2500 g, ‘has a history of infectious disease’ if you have had infectious disease for the last three months or ‘no history of infectious disease’ months of ‘early breastfeeding’ if supplementary feeds other than breastmilk from <6 months of age or ‘no early breastfeeding’ are supplemented by breastfeeding from the age of 6 months, the number of ‘big’ family members

if > 4 people or ‘small’ if ≤ 4 people, and ‘malnutrition’ if recorded has <-2SD or> + 2SD or ‘good nutritional status’ if it has a value of -2SD to + 2SD. Under-five child education is categorized as ‘low’ if graduated ≤ junior high school or ‘high’ if completed > junior high school. Univariate analysis is used to determine the distribution of characteristic frequency of mother and toddler. Bivariate analysis using chi-square test with 95% significance level ( $\alpha = 0,05$ ).

**RESULTS AND DISCUSSIONS**

The majority of children under five years of age and in control group were normal, ie 37 children under five (68.5%) and 89 under-fives (82.4%). The results showed there was a significant relationship ( $p = 0.045$ ) between the history of LBW and malnutrition incidence in infants. Toddlers who have a history of LBW have a risk of 2.152 times to experience malnutrition compared with infants with a history of normal birth weight. Low birthweight in infants is one of the impacts of maternal infant’s lack of nutrition during pregnancy<sup>8</sup>. The tendency of pregnant mothers who are less concerned about food intake greatly affects the nutrients obtained by their infants. UNICEF and WHO noted that the incidence of LBW is common in poor families. The majority of mothers in this study worked as housewives that allow for low access to information about nutritious foods during pregnancy. Besides, the majority of education and low economic status can also contribute to low knowledge and affordability for more nutritious food<sup>9</sup>. The socio-economic conditions of respondents in this study may also affect to malnutrition status among under-fives. But, in Bangladesh showed that higher education of mother and better household socio-economic conditions are not sufficient to reduce prevalence of LBW <sup>10</sup>.

**Table 1: The performance of maternal and infant characteristics (n = 54 case group; n = 108 control group)**

Characteristics	Case f (%)	Control f (%)
<b>Maternal age</b>		
15-19 year	0 (0)	2 (1.9)
20-24 year	1 (1.8)	20 (18.5)
25-29 year	19 (35.2)	32 (29.6)
30-34 year	28 (51.9)	36 (33.3)
35-39 year	6 (11.1)	11 (10.2)
40-45 year	0 (0)	7 (6.5)

Conted...

<b>Work status</b>		
Housework	34 (63.0)	59 (54.6)
Enterpreuner	13 (24.1)	31 (28.7)
Civil servant	0 (0)	3 (2.8)
Farmer	7 (13.0)	15 (13.9)
<b>Economic status</b>		
Low	36 (66.7)	33 (30.6)
High	18 (33.3)	75 (69.4)
<b>Infant age</b>		
6-12 month	2 (3.7)	6 (5.6)
13-24 month	10 (18.5)	29 (26.9)
25-36 month	15 (27.8)	28 (25.9)
37-48 month	10 (18.5)	29 (26.9)
49-60 month	17 (31.5)	16 (14.8)
<b>Gender of infant</b>		
Male	21 (38.9)	54 (50.0)
Female	33 (61.1)	54 (50.0)

The proportion of incidence of infectious diseases in toddlers in the case group (83.3%) was higher than that of a control group (33.3%) ( $p = 0.000$ ). Toddlers who have had infectious diseases have a risk of 10 times to experience malnutrition compared to infants who do not have infectious diseases. Healthy life behavior (HLB) can be one of the factors preventing the incidence of infectious diseases. Low of HLB can trigger a variety of infectious diseases that can inhibit the process of absorption of food substances in the body. It can lead to malnutrition status<sup>11</sup>. The children with handwashing with soap, brushing teeth, and using sandals correctly and regularly every day have a relationship which is significant with the nutritional status it has<sup>12</sup>. The low maternal education in this study may have low

knowledge of hygiene and health behaviors. It may have an impact on the high rates of infection among under-fives. The children who born from mothers who were educated had a better nutritional status<sup>13</sup>.

Delivery of early complementary feeding (ECF) (<6 months) also has a significant relationship with malnutrition incidence in infants ( $p = 0,000$ ). This was seen in the size of under-five of the case group given by ECF at age <6 months (74.1%) compared with control group controlled by ECF at age  $\geq 6$  months (62,9%). Toddlers who were given ECF<6 months will be at risk of malnutrition of 4.857 times compared to infants who were given ECF  $\geq 6$  months. It is a transitional period for a baby to begin to know food other than breast milk for the first time. At that age, the baby's weight has doubled from birth weight<sup>5</sup>. Supplementary feeding before a 6-month-old baby can cause diarrhea and some illness that leads to malnutrition or even death<sup>14</sup>. Early breastfeeding in infants has a long-term effect of becoming the leading cause of obesity in children<sup>15</sup>. Other research showed that the provision of ECF before the age of 6 months is related to picky eating behavior when the child is entering pre-school age compared to the child who has been given the ECF at the right time ( $\geq 6$  months). This can be a trigger for the lack of nutritional intake in children during their growth<sup>16</sup>.

The practice of early breastfeeding in infants in the case group is possible because the majority of women are poorly educated (87%) and work as housewives (63%). This condition allows the mother of the toddler to have low information access to breast milk, so that needed an intervention to increase its knowledge. Promotional interventions on breastfeeding may reduce stunting cases in 36 month-old children by 36%<sup>17</sup>.

**Table 2: Significant indicators of malnutrition status of infant**

Variables	Case n (%)	Control n (%)	P value	OR	95% CI
<b>Low-birth weight</b>					
Yes	17 (31,5)	19 (17,6)	0,045	2,152	1,008-4,595
No	37 (68,5)	89 (82,4)			
<b>Infectious disease</b>					
Yes	45 (83,3)	36 (33,3)	0,000	10	4,405-22,703
No	9 (16,7)	72 (66,7)			
<b>Early complementary feeding</b>					
Yes (<6 month)	40 (74,1)	40 (37,1)	0,000	4,857	2,357-10,010
No ( $\geq 6$ month)	14 (25,9)	68 (62,9)			

Conted...

Number of family member					
Big (>4 people)	32 (59,3)	39 (36,1)	0,004	2,696	1,371-5,301
Small ( $\leq$ 4 people)	22 (40,7)	69 (63,9)			
Maternal education					
Low level ( $\leq$ intermediate school)	47 (87,0)	63 (58,3)	0,000	4,796	1,986-11,579
High level (>intermediate school)	7 (13,0)	45 (41,7)			

The number of family members in this study also showed a significant relationship with the incidence of malnutrition in infants ( $p = 0.004$ ). The majority of households in the majority of cases have > 4 people (59.3%), while the majority of family members are  $\leq$  4 (63.9%). Toddlers who have large family members (> 4 people) will be at risk of 2,696 times to experience malnutrition compared to under-fives with smaller family members. A large number of family members will have implications for the high food needs of the family. The results showed that the majority of the economic status of low-grade case families (66.7%) were compared with the control group that mostly had high economic status (69.4%). The low economic status coupled with a large number of family members may have an impact on the fulfillment of nutritional needs in the family that is not achieved. Likewise in Bangladesh, there was finding showed low level of education of parent and poverty were associated with poor nutritional status<sup>18</sup>.

The percentage of low maternal education in the under-fives case group (87%) was greater than the control group control group (58.3%). There is a significant relationship between maternal education and malnutrition incidence in infants ( $p = 0.000$ ). Toddlers with low educated mothers are at risk of malnutrition by 4,796 times compared with under-fives who have a higher educated mother. In fact, other studies have shown that low-educated mothers are particularly at risk of poor child feeding<sup>19</sup>. Moreover, most of the mothers in case group (63%) work as housewives, so almost 100% matters relating to food is the responsibility of the mother. Therefore, low maternal knowledge of nutritious food intake can affect nutritional content in cooked and served foods. As the other finding noted that women's empowerment needed to increase child nutritional status. Furthermore, rigorous regulation should be established to facilitate women's empowerment in order to strengthen child nutritional well-being<sup>20</sup>.

## CONCLUSIONS

Mothers should pay more attention to and learn about a variety of nutritious foods during pregnancy and postpartum. Low maternal knowledge can also be enhanced by the education of nutrition from health workers who are more proactive in the service places visited by the mother.

**Conflict of Interest:** Kusuma Estu Werdani, Nurul Isnaini, and Yuli Kusumawati declare that they have no conflict of interest. All procedures followed in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1964 and its later amendments. Informed consent was obtained from all respondents being included in the study.

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**Ethical Clearance:** This protocol, site-specific informed consent forms (local language and English version), participant education and recruitment materials, and other requested documents – and any subsequent modifications - had been reviewed and approved by the ethical review bodies (Medical Faculty of Universitas Muhammadiyah Surakarta).

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# Mother's Knowledge, Attitude, and Practice of Exclusive Breastfeeding

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## ABSTRACT

**Background:** Low prevalence of exclusive breastfeeding was found in Indonesia. Risk factors for suboptimal exclusive breastfeeding were internal and external factors. Knowledge and attitude of mother are internal factors that can affect exclusive breastfeeding practice. This study aims to analyze mother's knowledge, attitude, and practice of exclusive breastfeeding.

**Method:** This cross sectional study was done in September-December 2017, 330 mothers who have children under five in Surabaya and Sidoarjo were participated and selected with simple random sampling. The association between knowledge, attitude, and practice were analyzed by Chi Square.

**Result:** More than half (52.7%) of mothers have a moderate knowledge about exclusive breastfeeding. Half mothers have a positive attitude toward exclusive breastfeeding. Negative attitude to the statements; breast milk can be replace by infant formula and working mothers can easily give exclusive breastfeeding. As much as 47.6% mothers had an exclusive breastfeeding. There were association between knowledge ( $p=0.003$ ) and attitude ( $p=0.000$ ) with exclusive breastfeeding practice.

**Conclusion:** Mothers with good knowledge and positive attitude have a good practice of exclusive breastfeeding to prevent stunting in the future life.

**Keywords:** *attitude, children under five, exclusive breastfeeding, knowledge, practice*

## INTRODUCTION

Breast milk is a nutritious food and it is often become a gold standard food to support child growth and development. WHO and Indonesian government recommend exclusive breastfeeding for 6 months, and continue until 2 years olds with complementary Feeding<sup>(1)</sup>. Exclusive breastfeeding support the optimal growth. Malnutrition prevalence including stunting prevalence was lower in children with exclusive breastfeeding than non-exclusive breastfeeding<sup>(2)</sup>. Children who received exclusive breastfeeding had a better immunity and it could lower the mortality<sup>(3)</sup> and morbidity rate<sup>(4)</sup>.

The superiority of breast milk as a nutritious food for babies has been well studied<sup>(5)</sup>. Nonetheless based

on Indonesian Nutritional Status Surveillance 2017, the prevalence of exclusive breastfeeding nationally is only 29.5% in 2016 and 35.7% in 2017. The East java Province also had a low prevalence of exclusive breastfeeding (34.9%).

There are several determinant factors of exclusive breastfeeding such as mothers knowledge, attitude<sup>(6)</sup>, occupation<sup>(7)</sup>, socio-economic status<sup>(8)</sup>, and normal or caesarean section<sup>(9)</sup>. Breastfeeding knowledge and attitude are positively related to exclusive breastfeeding<sup>(10)</sup>. Some studies about exclusive breastfeeding was done in Indonesia but it has a contradictory results<sup>(11,12)</sup> and small samples<sup>(13,14)</sup>. Therefore this study aims to analyze the association between mother's knowledge, attitude, and practice of exclusive breastfeeding in East Java.

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## METHOD

This cross sectional study was conducted in Surabaya and Sidoarjo, Indonesia in September-December 2017. Ethical clearance was obtained from the ethics committee

of Faculty of Public Health, Universitas Airlangga, no 503-KEPK. The sample of this study was 330 mothers who have children under five, which consist of 230 mothers from Surabaya and 100 mothers from Sidoarjo.

### DATA COLLECTION

Data were collected through interviews using a structured questionnaire by trained enumerators. The questionnaire consists of individual characteristics, knowledge, attitude, and practice of exclusive breastfeeding. Fifteen questions about exclusive breastfeeding knowledge and 9 statements of attitude were asked to the samples. Three point Likert rating scale from agree to disagree were used to assess mothers attitude. Try out questionnaire was done before data collection and improvement was made according to the results of try out.

### DATA ANALYSIS

Data were processed and analyzed using IBM program Statistical Package for Social Sciences (SPSS) version 22. Descriptive statistics including estimation of proportion were presented for categorical data. Breastfeeding knowledge were categorized as good (score >80), sufficient (score 60-80), and insufficient (score <60). Breastfeeding attitude from three point Likert rating scale from agree to disagree were recode into positive (score 2), neutral (score 1), and negative (score 0). All responses of attitude statements then summarize, and then times 10 and divided 1.8 so the maximum score was 100. After that, the scores were categorized as positive (score >80), neutral (score 60-80), and negative (score <60). The association between variables were analyzed by Chi-square test.

### RESULTS AND DISCUSSIONS

The mothers mean aged was 30.8 years old, meanwhile their children was under 2 years old (13.4 months). Most of them are housewives (80.9%). Working as a private employee was the most common among the working mothers. More than half mothers (56.4%) were graduated from high school, and almost a quarter (23.3%) were junior high school. Only ten percent of mothers who had higher education.

**Table 1: Socio-economic characteristics**

Characteristics	n (%)
<b>Mothers Occupation</b>	
Housewife	267 (80.9)
Private employee	37 (11.2)
Entrepreneur	14 (4.2)
Labour	5 (1.5)
Civil servant	3 (0.9)
Others	4 (1.2)
<b>Mothers Education</b>	
Elementary school	34 (10.3)
Junior high school	77 (23.3)
High school	186 (56.4)
Diploma	11 (3.3)
Graduate	21 (6.4)
Post-graduate	1 (0.3)
<b>Family Income</b>	
<IDR, 2,000,000	119 (36.1)
IDR 2,000,000 – 3,000,000	105 (31.8)
> IDR 3,000,000 – 4,000,000	79 (23.9)
> IDR 4,000,000 – 5,000,000	12 (3.6)
> IDR 5,000,000 – 7,500,000	9 (2.7)
> IDR 7,500,000	6 (1.8)
Mean of mother's age (years)	30.8±7.1
Mean of children's age (months)	13.4±8.5

More than 60% samples had a family income less than IDR 3,000,000 (~ US\$ 230.8). This was lower than regional minimum wages either in Surabaya or Sidoarjo. Only a few samples who had high income (>IDR 4,000,000; ~US\$ 307.7).

Table 2 showed that more than half (52.7%) mothers had a sufficient knowledge with mean score 73.4. The proportion of mothers with good knowledge (30.3%) was higher than insufficient knowledge (17.0%). This implied that most mothers had a sufficient knowledge about breastfeeding.

The items for breastfeeding knowledge instrument were comprised of 15 questions including the definition and benefit exclusive breastfeeding, time to give complementary foods, and when to stop breast milk. There were some items which were not well understood by the mothers, that is, the definition of exclusive breastfeeding, the benefit of breastfeeding for their children (growth, development, immunity, morbidity,



and mortality) and for themselves (mothers had a longer time to delay fertility postpartum so it could be delayed the pregnancy and slim faster).

**Table 2: Distribution of subjects by category of breastfeeding knowledge and attitude**

Category	n (%)
<b>Breastfeeding knowledge</b>	
Insufficient (score <60)	56 (17.0)
Sufficient (score 60-80)	174 (52.7)
Good (score >80)	100 (30.3)
Mean±SD score	73.4 ± 17.5
<b>Breastfeeding attitude</b>	
Negative (score <60)	37 (11.2)
Neutral (score 60-80)	129 (39.1)
Positive (score >80)	164 (49.7)
Mean±SD score	79.3 ± 14.9

Most mothers know and have heard about exclusive breastfeeding, but they didn't know the definition of it. The low understanding about the definition of exclusive breastfeeding can make the information bias and not synchronize when mothers asked if she gave exclusive breastfeeding for their infants.

Most mothers had a good knowledge about the timing of giving the breast milk and complementary foods. They knew that less than an hour after birth they had to give breast milk. They also knew when the best time to give the complementary foods, and when to stop breast milk.

From table 2, we can reveal that less than half mothers had a positive attitude towards exclusive breastfeeding. This finding was similar to a study from Southwestern Ethiopia<sup>(15)</sup>. Meanwhile more than one third mothers had a neutral attitude. Negative attitude towards statements; breast milk can be substituted by infant formulas, it is hard for the working mothers to give exclusive breastfeeding, and it is need a special training in giving breast milk. The 3 negative attitude can be constrains in giving the exclusive breastfeeding. Many mothers agreed that breast milk can be replace and substituted with infant formulas.

In normal condition, it is not recommended to give the infants other than breast milk. In medical indication, infant formulas were needed. According to the law of

Republic Indonesia no 36/2009 concerning health, article 128 stated "Every infant has the right to receive exclusive breastfeeding since birth for six months, except on a medical indication." The law also suggested that breast milk should be continued until 2 years old, together with complementary feeding<sup>(1)</sup>.

This medical indication (babies and or the mothers condition) described in more detail in the law of Republic Indonesia no 39/2013 concerning infant formula and others baby products, article 10-13. Medical indication are special condition when baby can only receive infant formula such as inborn errors metabolism (galactosemia, maple syrup urine disease, phenylketonuria, an others metabolic disorder), very low birth weight, and preterm birth. Meanwhile mothers medical indication were infected by human immunodeficiency virus, had a severe diseases, infected by herpes simplex virus type 1 and 2 in their breast, had a medical treatment (using psychotropic drugs, iodine 131 radioactive, iodoform topical and or cytotoxic chemotherapy drugs), and or the mothers had passed away, severe mental illness, or separated from the baby<sup>(16)</sup>.

**Table 3: Mother knowledge about exclusive breastfeeding**

Breastfeeding knowledge	n (%)
Knowing exclusive breastfeeding	261 (79.1)
Exclusive breastfeeding is no other food or drink, not even water, except breast milk for 6 months of life	161 (48.8)
Mothers should give breast milk to the newborn or maximal 1 hour after birth	310 (93.9)
Breast milk is important for infant	323 (97.9)
Breast milk give nutrition for child growth and development and increasing infant immunity	192 (58.2)
Breast milk contain colostrum, antibody, protein, taurine, carbohydrate, and fat	216 (65.5)
Exclusive breastfeeding made children smart, independent, and could decrease infant mortality and morbidity rate	155 (47)
Giving exclusive breastfeeding for 6 months are beneficial for mothers	303 (92.1)
Giving exclusive breastfeeding made mothers had a longer time to delay fertility postpartum so it could delayed the pregnancy and slim faster	149 (45.8)

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Breastfeeding could be replace by other food such as complementary foods	200 (60.8)
Breast milk better than breast milk substituted	324 (98.5)
Breastfeeding are nutritious, practical, cheap, and could increase bonding between mother and baby	205 (62.3)
Complementary feeding are best given at >6 months	288 (87.8)
Mothers should breastfed their baby frequently	265 (80.8)
Baby should be given breast milk until 2 years old	279 (85.1)

**Table 4: Mother attitude towards exclusive breastfeeding**

Statements	n (%)
Complementary foods for infants can be given at 4 months	82 (25)
Breast milk cannot be substituted with infant formula	126 (39)
Working mother can give an exclusive breastfeeding easily	112 (34.1)
Mothers gave their first breastmilk which were yellowish	307 (93.6)
Every infants have the right to accept exclusive breastfeeding	322 (98.2)
There was no need expertise or special training in giving breast milk	90 (27.5)
Breast milk should be given continuously until 2 years old	305 (93)
There was a differences in growth and development between breast milk and non breast-milk children	259 (79.2)
There was a differences in immunity between breast milk and non breast-milk baby	287 (88)

Another negative attitude toward exclusive breastfeeding were the working mothers cannot continue giving exclusive breastfeeding. Most of the samples said that it was hard to give an exclusive breastfeeding among working mother. This result was in-line with study from South Jordan which showed that working mother were less likely to practice exclusive breastfeeding compared to non-working mother. They perceived that insufficient amount of milk, end of maternity leave and no appropriate place for breastfeeding, wanted to improve babies weight gain, busy with work and no time for breastfeeding were the causes of premature breastfeeding cessation<sup>(7)</sup>. Study

from Malaysia also revealed that work place and short maternity leave can be the causes of not continuing exclusive breastfeeding<sup>(8)</sup>.

Table 5 showed that the prevalence of exclusive breastfeeding was 47.6% and it was higher than the national prevalence<sup>(17)</sup>. There was a tendency that mothers who had a good knowledge have a higher proportion of giving exclusive breastfeeding than the lower knowledge level. The same trend also found in breastfeeding attitude. Mothers who had positive attitude have a higher proportion of exclusive breastfeeding than a negative ones.

Chi square analyzed showed that there was a significant association between breastfeeding knowledge ( $p=0.003$ ) and attitude ( $p=0.000$ ) with exclusive breastfeeding practice. This result was similar with study Zhang et al. in Shanghai, China<sup>(10)</sup>. This significant association implied that improvement in knowledge and attitude become an important factors in increasing the prevalence of exclusive breastfeeding.

Study from Malawi and Indonesia confirmed that exclusive breastfeeding was associated with stunting<sup>(18,14)</sup>. Children who had a frequent infections could cost a lot of energy to protect and repair the clinical symptoms and tissue damage. This condition may impair the children growth<sup>(19)</sup>. Therefore it is necessary for the children to receive exclusive breastfeeding. Mothers transfer the immunity to their child through breastfeeding. Breastfeeding made the maternal IgG actively transport to the fetus. This antibodies are important for the infant during several months to protect their health<sup>(19)</sup>. A longer duration of exclusive breastfeeding correlate with lower prevalence of stunting<sup>(2)</sup>.

**Table 5: Association between breastfeeding knowledge and attitude with breastfeeding practice**

Variables	Exclusive Breastfeeding			p value
	Yes	No	Total	
<b>Breastfeeding knowledge</b>				
Insufficient	16 (28.6)	40 (71.4)	56 (100)	0.003
Sufficient	84 (48.3)	90 (51.7)	174 (100)	
Good	57 (57.0)	43 (43.0)	100 (100)	
Total	157 (47.6)	173 (52.4)	330 (100)	
<b>Breastfeeding attitude</b>				
Negative	7 (18.9)	30 (81.1)	37 (100)	0.000
Neutral	54 (41.9)	75 (58.1)	129 (100)	
Positive	96 (58.5)	68 (41.5)	164 (100)	
Total	157 (47.6)	173 (52.4)	330 (100)	

## CONCLUSIONS

Improvement in knowledge and attitude will increase exclusive breastfeeding. Good practice of exclusive breastfeeding can be an entry point to prevent growth retardation particularly stunting. Therefore it is important to increase mother knowledge and positive attitude towards breastfeeding. Particularly knowledge about exclusive breastfeeding definition and the benefit of breastfeeding for their children (growth, development, immunity, morbidity, and mortality). Increasing positive attitude about exclusive breastfeeding in working mother, the use of infant formula appropriately and everyone can give breast milk for their baby without any special expertise or special training.

**Conflict of Interest:** We declare no conflict of interest.

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**Ethical Clearance:** This research had received an ethical approval from Faculty of Public Health ethics committee No 503-KEPK.

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# Factors Associated with Cerumen Impaction in the Coastal Elementary Schools (Case Study in 1st Grade of five Elementary Schools, Bandarharjo Health Center's Work Area, in North Semarang)

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## ABSTRACT

Cerumen impaction on children in six cities of Indonesia is 30.5%. The case of cerumen impaction in 1st grade elementary school in the coastal area, Bandarharjo Public Health Center in 2015-2016 was significantly increased (18.34% and 32.77%). Cerumen impaction which is happened in pupils can caused hearing loss which impacted in abnormality growth, learning derivation, and difficulties in social adaptation. This study aimed to analyze the factors associated with the cerumen impaction case in 1<sup>st</sup> grade elementary students. This study was an analytic observational study with cross sectional approach conducted on 262 subjects in five elementary schools in the coastal area, Bandarharjo Public Health Center, North Semarang. The selection of the subject was done by simple random sampling to determine the name of the school and the children's name to diagnosed cerumen impaction, then parents of children interviewed using questionnaire. Around 50.8% children suffered cerumen impaction. The history of ear infections is associated with cerumen impaction ( $p = 0.004$ ;  $POR = 3.173$ ;  $95\% CI = 1.472-6.842$ ). Parents need to do infection prevention by not using ear-based cleaning tools and need to be educated about cerumen characteristics and functions.

**Keywords:** cerumen impaction, factors associated, grade 1 elementary school, coastal, bandarharjo

## INTRODUCTION

Indonesian Health Ministry in National Strategic Plan targeted hearing loss can be prevented until 90% for reaching sound hearing in 2030.<sup>1</sup> Cerumen impaction which is happened in pupils can caused hearing loss which impacted in growth disorder, learning derivation, and difficulties in social adaptation.<sup>2</sup>

A research in South Africa showed that 6.6% students had cerumen impaction and 7.5% was diagnosed as hearing disorder.<sup>3</sup> Indonesia Community of

Sight and Hearing Health survey in 7 provinces revealed outer ear disease prevalence was (6.8%) which the main cause of the outer ear morbidity was cerumen impaction (3.6%) and the highest case was happened in school-age children (7–18 years old).<sup>1</sup> Previous studies were also showed similar results such as in Semarang amounted 21.4% were suffered cerumen impaction and 6.2% students had hearing disorder<sup>4</sup> and at Pantai Bahu coastal area revealed 22.6% society had bilateral cerumen, 6.5% had perforated timpani bilateral membrane, dan 12.9% cannot be evaluated due to cerumen blocked ear.<sup>5</sup>

Preliminary study conducted by Community Health Center of Central Java in 2016 showed that cerumen impaction was the first rank of the top ten ear diseases which 2 until 20 patients visited every day. The highest visit prevalence was children at 5–14 years old (28.8%).<sup>6</sup> Cerumen impaction prevalence in 1<sup>st</sup> grade of 24 elementary students in coastal area – Bandarharjo Public Health Center in 2015 was 18.34% then increased into 32.77% in 2016.<sup>7</sup>

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Mahardhika revealed that cerumen impaction could be impacted by internal factors such as age, genetic, ear canal diameter, shape and anatomy deformity of ear canal, mental retardation, down syndrome, and body mass index. External factor including socio-economic, environmental condition, knowledge about ear health, cleaning ear with cotton bud behavior, ear infection, and adrenergic drugs used.<sup>5,8</sup>

In nowadays, research for knowing cerumen impaction factors were still limited and had different results.<sup>8</sup> This research aimed to analyze factors which contributed to cerumen impaction case in 1<sup>st</sup> grade of coastal area elementary school, especially Bandarharjo Public Health Center working area, North Semarang.

## METHOD

**Study Population:** A simple random sampling for elementary school name and students' name. This research used 262 of 1<sup>st</sup> grade students in 5 elementary schools as subject and their parents as respondents.

**Study Design:** This was an observational analytic with cross sectional approach.

**Measurement:** Gender was measured by direct observation. BMI was measured by children

anthropometric measurement based on WHO standard. Subject's weight used digital scale and microtoise for height. Respondent's knowledge and behavior, and ear infection history were traced by questionnaire which had been previously trusted by validity and reliability test. Cerumen impaction checkup was done by otoscopy examination method which conducted by ear, nose, and throat doctor from Agency for Hearing Disorder and Hearing Loss Central Java Province.

**Statistical Analysis:** Univariate and bivariate data analysis were used on this research. Relation in each variable was analyzed by chi square ( $X^2$ ) test. P value < 0.05 marked as significant in statistic.

## RESULTS AND DISCUSSIONS

**Cerumen Impaction Case:** The proportion of gender of 262 1<sup>st</sup> grade students in 5 elementary schools was slightly different. The age ranged from 6 until 9 years old. Subject's parents were about 25-45 years old. Most of the parents had graduated from senior high school (SHS). Majority of father worked as private sector employees (41.6%) and most of mothers were housewife (50.8%). The cerumen impaction case proportion was more than a half from total sample (50.8%) (Table 1).

**Table 1: Frequency Distribution of Cerumen Impaction Case**

Elementary School Name	Cerumen Impaction Case				Total	
	Positive		Negative		f	%
	f	%	f	%		
Tanjung Mas	37	14.1	10	3.8	47	17.9
Kusuma Bhakti	24	9.2	30	11.5	54	20.6
Bandarharjo 2	29	11.1	15	5.7	44	16.8
Dadapsari	33	12.6	22	8.4	55	21.0
Sultan Agung 2	20	7.6	42	16.0	62	23.7
Total	133	50.8	129	49.2	262	100.0

**Table 2: Variables of Gender, BMI, parents knowledge, parent behaviour, and infection with cerumen impaction case**

Variables	Subvariables	Cerumen Impaction				Test of Significance
		Positive		Negative		
		f	%	f	%	
Gender	Female	58	49.2	60	50.8	P value : 0.728 POR : 0.889
	Male	75	52.1	69	47.9	

Conted...

<b>BMI</b>	Fat-obesity	33	45.8	39	54.2	P value : 0.399 POR : 0.762
	Thin-normal	100	52.6	90	47.4	
<b>Parents Knowledge</b>	Lack	64	51.6	60	48.4	P value : 0.891 POR : 1.067
	Good	69	50.0	69	50.0	
<b>Parents Behaviour</b>	Risky	42	57.5	31	42.5	P value : 0.221 POR : 1.459
	Safe	91	48.1	98	51.9	
<b>Ear Infection History</b>	Available	28	73.7	10	26.3	P value : 0.004 POR : 3.173
	Not available	105	46.9	119	53.1	

**More Than 50% Cerumen Impaction Case:** This result is similar with previous studies mentioned the high score cerumen in the children group was caused by cerumen production increase due to sebaceous glands production starting to increase in 7 years old children and continuing by ages, cerumen score will decrease in middle age, adult, and elder, and will rise again in the late elder age.<sup>9,10</sup>

**No Relation Between Gender and Cerumen Impaction Case:** Substances which consisting cerumen are variative depend on gender, age, and menstruation phase. Cerumen sample which is taken on follicular stage from 19-40 years old women having higher cholesterol and squalene level, in the same age men's cholesterol level were lower than women's.<sup>11</sup>

This result might happen because the subject were 1<sup>st</sup> grade students (7-9 years old) (Table 2), which not enter puberty phase yet, so at their age there is no differences in ester and cholesterol level either in girls or boy. In cerumen subject, the highest ester and cholesterol level was placed by 1-10 years old children (for girls and boys).<sup>11</sup>

Cerumen impaction is commonly happened in men rather than women, it was impacted by hair in men's ear hole was thicker and rougher can disturb natural cerumen cleaning.<sup>12</sup> There was also relation between seasonal diet and triglyceride cerumen production, sexual hormone contributed only in small part in lipid substance and cerumen production level.<sup>13</sup> Cerumen sebum production decrease in men and women corelated with age, cerumen sebum level rise peaked in age 15-35 and slumped along adult age.<sup>14,15</sup>

**No Relation Between Body Mass index and cerumen Impaction Case:** The obese person having metabolism disturbance tendency—over lipogenesis, so can increase free fatty acid level (major compound of cerumen) in the body.<sup>16</sup>

That no relation can be caused by homogeneity of the samples or imbalance total number of samples which were compared; cerumen impaction case mostly happened in children with thin-normal BMI (52.6%) rather than happened in samples with fat-obesity BMI (45.8%) (Table 2).

Previous study revealed no remarkable relation between BMI and cerumen impaction case number (p = 0.803) caused imbalance of samples compared, patients with weight less than standard until normal (71.9%) were higher than upper standard weight patients (28.1%).<sup>17</sup>

However, other research showed relation between seasonal diet and triglyceride production.<sup>13</sup> Research differences can be caused by the more accurate laboratory testing method in her research for identifying the availability of triglyceride decrease in respondent who did seasonal diet. Meanwhile BMI measurement on this research used direct height and weight measurement.

**No Relation Between Parent Knowledge and Cerumen Impaction Case:** Good ear cleaning knowledge will give good result in hearing disturbance prevention. Majority of people think that cerumen is a dangerous waste for the body. It affects manual individual ear cleaning.<sup>18,19</sup> Hubson observed in 325 people then resulted that majority of people cleaning their ears using cotton buds routinely and did not know their drawback effect from this activity.<sup>20</sup>

The no relation might be because knowledge was not direct influence factor in cerumen impaction case. Proportion of parents who have good knowledge in this study is more than half the number of respondents, merely (52.7%) (Table 2). This result also can be caused by good knowledge parent had probability to not applied their knowledge in their daily live. It can be showed by parent who knew that cleaning cerumen with cotton

buds can push cerumen entering deeper into the ear (66.8%), and (55%) parent knew that cleaning cerumen with cotton buds can injure ear-hole-skin (Table 2). Meanwhile majority of parent (85.1%) used cotton buds for cleaning their children ear. Moreover, on site research found 9.2% parent used hard material for cleaning ear, such as stainless (Table 2). The habit to clean ear with cotton buds or hard material tools for ear cleaning can disturb natural cleaning mechanism and can push skin cells death and cerumen into eardrum, so the earwax accumulated which can caused cerumen impaction.<sup>21</sup>

**No Relation Between Ear Cleaning and Cerumen Impaction Case:** Cotton buds that used uncarefully can impacted tympanic membrane damage and damaging ear canal epithelium skin, so cerumen migration outside was disturbed.<sup>22,23,24</sup> This result similar with previous study which presented that swabs of cotton was not influence in right ear samples examined (p value=0.270), while connected with 75% cerumen impaction case of children's left ear (p value=0.02), this difference can be caused by different technique in left or right ear cotton buds used.<sup>25</sup>

This research result can be impacted by other factor that can influenced, such as outer ear infection history. It means that even majority of parent had safety behavior (not risky) merely 72.1%, but if children had infection history in multiple time can caused inflammation reaction in ear, in consequence cause over apocrine glands production in ear canal as body defense to protect ear canal so produced accumulated product which blocked ear.<sup>23,26</sup>

Ear canal (*canalis acusticus externus*) diameter size was also predicted as a caused of no relation both these two factors in 1<sup>st</sup> grade students. First two decades of young age groups were founded having externa canal auditory diameter relatively smaller rather than adult.<sup>9</sup> Cerumen score decrease in adult until elderly age due to ear canal has met its maximum size and does not grow anymore.<sup>9</sup> On site research found that one of cerumen impaction children suffered bilaterally and cerumen extraction could not be taken due to the left ear canal was narrow.

**Relation Between Ear Infection History and Cerumen Impaction Case:** Multiple ear infection or allergy can cause inflammation reaction in the ear, so impacted in over apocrine glands production on ear canal as body defense to protect ear canal which caused blocked ear by product accumulation.<sup>23,26</sup>

This research showed that ear infection history associated with cerumen impaction case with p value=0.004 (p<0.05). This correlation was reflected by 14.5% children who had outer ear infection history, cerumen impaction children proportion was 73.7%, it was higher than children without cerumen impaction (26.3%). In addition, association strength could be seen from POR value=3.173 (CI 95%=1.472-6.842), it means that children with outer ear infection history had bigger risk in suffering cerumen impaction 3.172 times than children who never had outer ear infection history (Table 2).

Predisposing factors which contributed in outer ear infection including minor trauma when prying ear, trauma due to scratches by hair clip, matchstick, or others tools which not supposed to cleaning ear, frequently cleaning ear after swimming when canal skin had macerated.<sup>27</sup> The suitable ear caring can be done by simple steps such as cleaning external ear using clean wet fabric, then if cerumen accumulation is founded should be handled by doctor.<sup>28</sup> The parent's behavior (Table 2) can impact in canal ear lipid layer skin loose. Lipid layer in ear canal skin aims to skin macerate prevention and block bacteria when entering skin by apopilosebacea skin. If lipid layer loose due to multiple ear cleaning, so pathogen organism which embedded in ear canal can grow then make easier ear infection.

## CONCLUSIONS

Cerumen impaction case proportion were more than a half of total samples (50.8%). Gender (p value=0.728), body mass index (p value=0.399), parent knowledge (p value=0.891), parent behavior (p value=0.221) did not have significance relation with cerumen impaction case. Meanwhile, ear infection history (p value=0.004) had significance relation with cerumen impaction case. Need parent's education on how to prevent cerumen impaction.

**Conflict of Interest:** The authors declare that we have no conflict of interest.

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# Exploring the Compliance Test for X-ray in Health Facilities Security of Makassar Region

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## ABSTRACT

The initial observation on compliance test for X-ray facilities reported that some of them were failed to meet the obligation of compliance test provided by the Health Facilities Security of Makassar Region or BPFK Makassar. The purpose of this study was to explore the reasons for their failure to fulfill the obligation on X-ray facilities compliance and services. This research employed qualitative methods. The ten informants of 9 primary informants and 1 secondary informant from the X-ray health facilities in Makassar of South Sulawesi Island were interviewed. The result behind the success in their compliance test was mainly due to the presence of the supervision team from the Nuclear Energy Regulatory Agency of Indonesia. Additionally, another factor such as the presence of internal and external supervision also played significant support to be able to fulfill the compliance test for X-ray facilities. At the other side, inadequate funding and lack of understanding about the purpose and obligation of the compliance test were mostly informed by the respondents as the main reasons for their failure to comply with the calibration test of the X-ray facilities. Therefore, external and internal supervision should be strengthened to increase the compliance test among X-ray health facilities in Makassar.

**Keywords:** *Compliance Test, X-ray, Health Facilities, Nuclear Energy Regulatory Agency*

## INTRODUCTION

The Minister of Health of Indonesia Regulation Number. 432/MENKES/SK/IV/2007 on occupational safety and health management for the hospital stipulated that radiation is one of potential physical hazards to be concerned by planning, organizing, implementing, and controlling aiming to cultivate occupational safety and health in the hospital especially in radiology examination.

The ionizing radiation that involves the human body can cause deterministic effects such as skin erythema, cataract, sterility, nausea, diarrhea, fetal death, stochastic effects such as cancer, and hereditary defects.<sup>1</sup> The radiation protection is useful to prevent the deterministic effects and to decrease the probability of stochastic effects among workers.

Meanwhile, the compliance test is an assurance of the X-ray used to prevent unnecessary radiation dose on the patients, the workers and the person who may around. The x-ray machine reliability assurance in Indonesia is regulated by BAPETEN Regulation Number 9/2011 regarding the implementation of the compliance test and the Indonesian Minister of Health Regulation Number 54/2015 on the medical equipment compliance test. According to BAPETEN Regulation Number 9/2011, every health facilities that request a new permit or an extension of the license of X-ray machine is mandated to apply for the compliance test. If a case occurs.<sup>2</sup>

The services of the compliance test applied by BPFK Makassar include 10 zones in eastern Indonesia: South Sulawesi, West Sulawesi, Central Sulawesi, Southeast Sulawesi, Gorontalo, North Sulawesi, North Maluku, Maluku, Papua, and West Papua. From 2015 to 2017 some 124, 114, 134, and 145 facilities around the Eastern part of Indonesian territory had the compliance test once or twice. The Director General of Health Services of the Ministry of Health Republic Indonesia showed that 315 hospitals under BPFK Makassar's coverage of General Hospitals and Specialty Hospitals had the X-ray

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facilities.<sup>3</sup> Unfortunately, many of them did not meet the standard of twice compliance tests annually. According to a theory, the input, the process, and the output in health administration is unique according to who and how to deal with their limitation.<sup>4</sup>

There are some aspects such as health facilities, fund, policy, and feedback that are in need to boost the fulfillment of twice compliance tests for the X-ray facilities annually.

## METHOD

This research was qualitative research. The government's X-ray facilities that implement twice tests continuously or called 'S.P.A,' while the private X-ray facilities are called 'S.P.B.' The government health facilities that do not implement the twice tests

periodically are called 'S.P.C,' and the private ones are called 'S.P.D.' The informants consisted of management staff and a technical worker from both sides, the X-ray facilities and the BPFK of Makassar. An in-depth interview was employed to gather data. A total of ten informants from the X-ray health facilities in Makassar of South Sulawesi Island were interviewed, and their responses were re-check using triangulation with the BPFK staff and technical operator.

## RESULTS

**Data Analysis of BPFK Makassar:** According to BPFK Makassar services, the compliance test from 2014 to 2017 increased in term of the number of test participants, besides the decreasing number of health facilities from 124 facilities to 114 from 2014 to 2015. The result of the implementation of the test can be shown in Table 1..

**Table 1: A number of health facilities implement the compliance test and calibration in the year of 2014–2018**

Province	2014	2015	2016	2017	2018*
North Sulawesi	8	8	8	10	6
South East Sulawesi	9	5	7	12	2
Central Sulawesi	11	7	11	15	8
South Sulawesi	57	51	66	55	17
West Sulawesi	4	4	3	7	0
West Papua	6	1	3	2	1
Papua	7	9	7	9	2
North Maluku	5	4	7	4	4
Maluku	6	2	5	8	2
Gorontalo	6	14	6	9	2
Outside The Working Area of BPFK Makassar	5	9	11	14	4
Total	124	114	134	145	48

\*The data until 2018 May

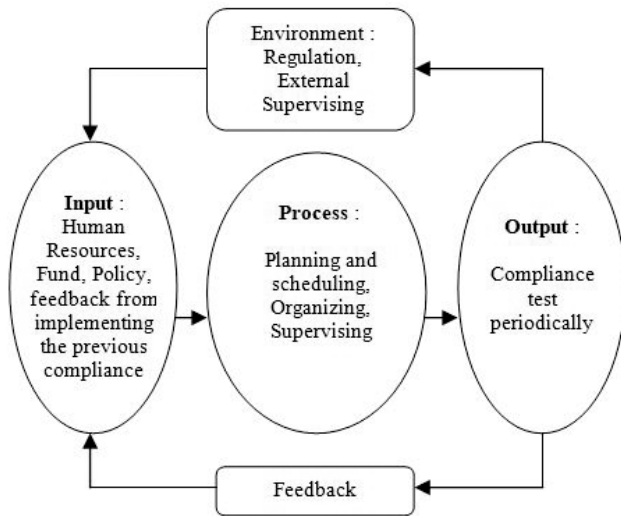
South Sulawesi is a province with the largest number of health facilities in East Indonesia. Almost half or 44.29% implemented the compliance test with BPFK Makassar annually. In 2017, there was an increasing number of compliance test participants up to 70% of X-ray facilities.

**Table 2: The number of Health Facilities based on both possession of government and private from year of 2014-2018**

Health Facilities	2014	2015	2016	2017	2018*
Central Government	4	4	6	5	4
Province Government	12	11	12	17	3
County/City Government	48	40	56	57	16
Another Minister	2	2	2	3	0
Private Hospitals	28	24	29	30	7
Clinics	24	26	14	24	7
BUMN	1	2	3	0	0
Companies	2	2	4	2	4
TNI/POLRI	3	3	8	7	7
Total	124	114	134	145	48

\*The data until 2018 May

In the input, process, and output are shown in figure 1. the X-ray facilities attached to the government showed an increase in compliance test fulfillment, but the private ones didn't show any progress.



**Figure 1: Scheme of the application of the compliance test and calibration with Systems Theory**

**Interviews Result**

**Input:** All management and staff in ‘SP.A,’ ‘SP.B,’ and ‘SP.C’ knew the latest regulation of the compliance test that should be fulfilled biennial or once every two years along with the extension of the license. Funding was the main reason for failure in the fulfillment of the compliance test.

Subsequently, the standard operating procedure had to be implemented for the X-ray facilities if the facility sought the compliance test and licensed to operate it.

The ‘SP.A,’ ‘SP.B’ and ‘SP.D’ obtained the compliance test with BPFK Makassar. However, ‘SP.C’ had calibrated with private labs in 2017. Financially, one of the respondents said that the cost of medical equipment calibration by BPFK Makassar is too expensive.

**Process:** Planning for the test was conducted annually. The X-ray Facilities with (‘SP.A’) could not schedule the test because they had no staff to be in charge of the implementation achievement. The ‘SP.B’ code of X-ray facility usually set a reminder on the 90th days before the expiration of the X-ray license.

Staffing had been applied by the management ‘SP.A,’ ‘SP.B,’ and ‘SP.C’ by employing staff for coordinating this implementation of the compliance test and calibration. A radiation protection officer directly involved in the

process of the test. The ‘SP.D’ code for the radiology clinics own by private did not have the coordinator for their compliance test. Therefore, a radiation protection officer should take in charge of compiling the documents of the standard of the permission for the compliance test.

Nuclear Energy Regulatory Agency (BAPETEN) once conducted inspections in all of the research subject. The compliance test related to the accreditation requirements as well as a mean to protect the patient. Subsequently, marketing aspects are also taking advantages of the compliance aspects of the X-ray facilities.

**Output:** Research subjects ‘SP.A’ and ‘SP.B’ applied the compliance test and calibration periodically, due to human resources awareness on the rules and the benefit of the compliance test. Currently, a significant fund is available to cover the test by BPFK Makassar. However, the calibration was not implemented in ‘SP.C’ due to the insignificant fund, even though ‘SP.C’ was supported by the input system.

The implementation of the calibration periodically could not be applied in ‘SP.D’ due to the lack of understanding the implementation of calibration for every year, but mere applying the compliance test for the standard of the permission for two year.

**DISCUSSIONS**

Health facilities in two areas such as both West and South Sulawesi could apply the compliance test and calibration due to the close distance with BPFK Makassar. However, health facilities in West Papua could use this test least due to this reason. West Papua is a large area, where most of the regions are wildlife jungle. Technical Unit in Papua could not afford this compliance test, so Papua and West Papua must invite the BPFK testers. According to Weeren (2016), convenience places affected partially.<sup>5</sup>

**Input:** The supervision from Nuclear Energy Regulatory Agency towards the X-ray facilities and the requirement for a license are the contributor for their implementation of the compliance test. A sanction is enforced according to the Regulation on nuclear energy Number 10/1997.<sup>6</sup>

The compliance test and calibration of the X-ray facility are related to the availability of funding as informed by the respondent. Lack of financing among ‘SP.C’ X-ray facilities was the reason for not being able

to fulfill the compliance test. Although the commitment of the organization presence, without sufficient funding, the compliance test was trying to enforce.<sup>7</sup> Government Regulation Number 21/2013 stipulated that funding should cover the accommodation, transportation, and daily allowance for the person who conducted the test. However, many X-ray facilities perceived a significant burden to accommodate the compliance test cost.<sup>8</sup>

The BPFK Makassar has the dimension of service quality with top categories and the aspect of services quality with sufficient excellent facilities that put them in a pressure to work harder in convincing and advocating X-ray facilities to obtain the compliance test.

**Process:** The correct information system can strengthen the importance of the planning, and ensure the preparation run well.<sup>9</sup> SPB applies the information system through plan ordered in the last year, concerning the limit time of the certificate, so SPB can afford to employ the calibration test punctually.

As BAPETEN Chairman's Regulation No. 4/2013, health facilities utilizing the source of ionizing radiation should have the radiation protection officers. Health facilities had the radiation protection officers even though the officers were not the permanent employees. The test coordinator pointed is to be expected to ease the implementation of the compliance test and calibration periodically. Even though SPC had the test coordinators but the fact of the lack of fund caused not the application of the compliance test and calibration regularly. The role of radiation protection officer is essential, but if their obligations are violated, merely used as the standard of nuclear energy permission, so the sanction will be conducted as mentioned in Regulation Number 10/1997.<sup>10</sup>

The most effective supervision is an inspection from BAPETEN. However, it is just limited to the implementation in the compliance test for the permission. People should concern labeling applied by BAPETEN for their common safety. In the calibration implementation, the factor of accreditation assessments done by health facilities becomes the supporting factor of the execution of the compliance test and calibration routinely. SPB also did the internal supervision through the internal audit for every year. This audit is a management step as the supervision effort if disobedience is found in the result of the internal review so that the top management can stop the operational examination permission. The

health facilities supervising the implementation of compliance test and calibration to reduce doses received by the officer, although the addition of radiation doses is also influenced by use inappropriate personal protective equipment.<sup>11</sup>

**Output:** The implementation of the compliance test and calibration routinely applied by 'SP.A' and 'SP.B' was affected by the changed input: knowledge and obedience of the human resources towards the regulation of these two tests, the availability of sufficient fund, of procedure, run well, changed the process of planning, staffing, and supervising can increase this implementation.

The application of radiation safety management by applying the quality control of x-ray machine in health facilities should be conducted as it mentioned in its regulations.<sup>12</sup>

## CONCLUSIONS

The X-ray facilities without complying with the regulation on compliance test existed in the coverage area of BPFK Makassar.

The inspection by BAPETEN supported the implementation of the compliance test. The requirement to extend the license operation of the X-ray facility contributed to comply with the compliance test.

**Source of Funding:** Funding also played an essential role in meeting the compliance test mandatory.

**Conflict of Interest:** The Authors declare no conflict of interest in this article. This research is self funded.

**Ethical Clearance:** The Ethical Clearance was obtained from the Committee of Ethical Research No. 069/EC/FKM/2018 on 04 June 2018

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# A Comparative Analysis between Integrated Occupational Safety and Health Management System in a Support Mining Company and the Indonesian Mining Safety Management System

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## ABSTRACT

A support mining company implements the main company's, Occupational Safety and Health Management System (OSH-MS) called "FRESH" Management System. Meanwhile, the current management system of the Indonesian Mining Safety Management System has to fulfilled by all mining company, regardless main or support or sub-contractor company.

This research aimed to analyze the fulfilment of the existing integrated Occupational Safety and Health Management System toward the Indonesian Mining Safety Management System.

The approach of this action research was a qualitative design. The subject of this research was the Occupational Safety and Health Management System of a supporting company called "X". Data was gathered from the implementation of the "Hazard Identification Risk Assessment and Determination Control (HIRADC)" as well as the existing integrated Occupational Safety and Health Management System included the person in charge as to be matched with the Indonesian Mining Safety Management System

This study resulted in a new format of standardized elements of Occupational Safety and Health Management System for the company X in accordance with the Government Regulation of Republic Indonesia Mining Safety Management System. The result indicated that a positive feedback from the company's top management to make a pilot project using the new format standard of the supporting company "X." In conclusion the new design from this study is implemented.

**Keywords:** Occupational Safety Health Management System, Mining Safety Management System, Design.

## INTRODUCTION

In 2014, the Government of the Republic of Indonesia established the Regulation of the Minister of Energy and Mineral Resources MINERBA No. 38 concerning Mining Safety Management System.<sup>1</sup> The

regulation was established to ensure the availability of an integrated system in controlling the risk of occupational safety and health in mining operations. The legal basis of the establishment of the Regulation of Minister of Energy and Mineral Resources is the Constitution of 1945, Act No. 13 year 2003 concerning Manpower and Government Regulation No. 50 Year 2012 concerning the Implementation of Occupational Safety and Health Management System.

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PT.X is a company of Power Plant and Distribution Transmission operating in the mining environment of PT. Y. Located on the same site, the company is a supporting company specialized in power supply to the mining area of PT. Y. PT. X applies similar management system to its parent company, known as FRESH (Freeport Safety Health Management System). The elements of FRESH are:



1. Premises and Housekeeping
2. Mechanical, Electrical, and Personal Safeguarding
3. Management of Fire and other Emergency Risk
4. Incident Recording and Investigation
5. Organizational Management

FRESH is based on National Occupational Safety Association (NOSA) CMB 150N, Regulation of Minister of Energy and Mineral Resources No. 555 Year 1995, Mine Safety Health Association (MSHA), Occupational Safety Health Association (OSHA) and Occupational Health and Safety Assessment Series (OHSAS) 18001. PT. X responded to the Regulation of the Minister of Energy and Mineral Resources MINERBA No. 38 concerning Mining Safety Management System by reorganizing current OSH-MS.

**RESEARCH METHODOLOGY**

The research was a qualitative research with inductive approach.<sup>2</sup> Sample of the research was managerial staffs acting as the member of Occupational Safety and Health Committee (OSH Committee), who master the implementation of Mining Safety Management System, consisting of General Manager as the Chief of the committee (1 person), OSH as Secretary (2 persons), and General Superintendent as committee members (6 persons).

**RESULT**

**Assessing the Implementation of Hazard Identification Risk Assessment and Determination Control (HIRADC) in PT. X:** From the implementation of Hazard Identification Risk Assessment and Determination Control (HIRADC) in PT. X, a manager in steam-electric power plant

Based on the response, it can be concluded that the implementation of HIRADC in PT.X is as expected, which has been done thoroughly and profoundly on all aspects of work. The highest risks observed in PT.X were:

1. Electricity Shock
2. Failure in Energy Isolating
3. Lifting operation failure
4. Falls from Height
5. Hand or Body Injury
6. Spinal Injury/Low Back Pain
7. Traffic Collision
8. Exposure to Toxic Gases
9. Hearing loss
10. Financial loss

The identified hazards and risks are already included in hazard control so that the risk can be mitigated at an acceptable level. From the interview, it was clear that PT.X had committed to prioritize the safety and health of its assets, which are the employees.

**Gap Analysis between OSH-MS of PT.X and Mining Safety Management System:** The result shows that OSH-MS of PT.X has achieved 85% compliance to Indonesian

Mining Safety Management System. From al 555 elements (including sub-elements and sub sub-elements) of Indonesian Mining Safety Management System, all of which has been implemented by PT.X, yet the implementation has not met the terms as required. Some of the elements as well as its sub-elements were identified as impossible to be implemented since the elements are not compatible with the operational of PT.X.

There were no significant or critical differences from seven elements of Indonesian Mining Safety Management System to five elements of OSH-MS implemented by PT.X, which means that urgent actions are not necessary. The element with the lowest compliance was Management Review. PT.X has just implemented the element after the establishment of Indonesian Mining Safety Management System. The following tables present compliance percentage from each element.

**Table 1: Compliance of OSH-MS to Mining Safety Management System**

No.	Elements	Max Points	Compliance Point	Percentage (%)
1.	Policy	200	171	85%
2.	Planning	200	146	71%
3.	Organization and Personnel	150	142	94%
4.	Implementation	200	156	78%
5.	Evaluation and Follow-up	150	115	77&

Conted...

6.	Documentation	50	30	60%
7.	Review from Management	50	28	57%
TOTAL		1000	852	85%

### Design of Standard Elements of OSH-MS of PT.X:

The model of OSH-MS design based on the following description is suitable to be apply into the power generation and transmission distribution company in mining operation.

There are seven standard elements, which are in line with standard elements of Indonesian Mining Safety Management System. Those elements are:

1. Policy
2. Planning
3. Organization and Personnel
4. Implementation
5. Evaluation
6. Documentation
7. Management Review

The concept of Indonesian Mining Safety Management System is more specific compared with other concepts of OSH-MS elements.

**Table 2: Design of Element 1 (Policy) and Element 2 (Planning)**

No.	Description of Standard Elements	Article No.
<b>1. POLICY</b>		
1.1	Policy of Occupational Safety and Health (OSH) and Operational Safety (OS)	Article 6
<b>2. PLANNING</b>		
2.1	Hazard Identification Risk Assessment and Determination Control (HIRADC)	Article 7a,7b
2.2	Management of Change	Article 7a,7b
2.3	Regulatory Compliance	Article 7.c
2.4	Goals, Objectives, and Programs	Article 7.d
2.5	Work plan and Budget of OSH and OS	Article 7.e

Element 3 “Organization and Personnel” that was listed in elements of Indonesian Mining Safety

Management System should be carefully designed for mining company since there are specific role in OSH committee, like Chief of Mining Engineering or Operational Responsible Person. Another element, that is Element 6 or Documentation, should be also considered since the element provide a method to provide an aspect of ease to manage documents and mining company has many documents to be managed.

**Table 3: Design of Element 3 (Organization and Personnel)**

No.	Description of Standard Elements	Article No.
<b>III. ORGANIZATION AND PERSONNEL</b>		
1.	Organizational Structure	Article 8.a
2.	Appointment of Operations Responsible Person	Article 8.c
3.	Organizational Structure of OSH and OS Section	Article 8.d
4.	Appointment of Operational and Technical Supervisor	Article 8.e
5.	Safety Accountability Program for Supervisors	Article 8.e
6.	Appointment of Specialized Technical Personnel	Article 8.f
7.	OSH and OS Committee	Article 8.g
8.	Emergency Response Team	Article 8.h
9.	Selection and Placement of Personnel	Article 8.i
10.	OSH and OS Representatives	Article 8.i
11.	OSH and OS Education, Training, and Competence	Article 8.j
12.	OSH and OS Communication	Article 8.k
13.	OSH and OS Administration	Article 8.l
14.	OSH and OS Participation, Consultation, Motivation And Awareness	Article 8.m

Substandard elements in Mining Safety Management System were designed according to articles in the Regulations of Ministry of Energy and Mineral Resources by adjusting previous OSH-MS

standards through the result of analysis on HIRADC implementation and the result of gap analysis between the standard and substandard elements of Mining Safety Management System and previous OSH-MS.

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**Table 4: Design of Element 4 (Implementation)**

No.	Description of Standard Elements	Articles No.
<b>IV.</b>	<b>IMPLEMENTATION</b>	
1.	Work Procedure	Article 9.a
2.	Working at Height	Article 9.a
3.	Open Hole	Article 9.a
4.	Coal Handling	Article 9.a
5.	Working over or near water	Article 9.a
6.	Work Permit	Article 9.a
7.	Personal Protective Equipment	Article 9.a
8.	Work Environment and Occupational Health Management	Article 9.b, 9c
9.	Work Environment Management – Physical Threats	Article 9.b, 9c
10.	Work Environment Management – Chemical Threats	Article 9.b, 9c
11.	Work Environment Management – Biological and Ergonomic Threats	Article 9.b, 9c
12.	Work Environment Management - Housekeeping	Article 9.b, 9c
13.	Office Safety	Article 9.b, 9c
14.	Hearing Conservation Program	Article 9.b, 9c
15.	Heat Stress	Article 9.b, 9c
16.	Management of work-related fatigue	Article 9.b, 9c
17.	Radioactive Management	Article 9.b, 9c
18.	Occupational Health Management	Article 9.b, 9c
19.	Operational Safety	Article 9.d
20.	LOTOTO	Article 9.d
21.	Boiler, Pressure System and Gas Container	Article 9.d
22.	Moving assets Operational Safety	Article 9.d
23.	Elevator and Crane	Article 9.d
24.	Fixed Asset Management	Article 9.d

25.	Warning, Signage, and Traffic Signs	Article 9.d
26.	Safety Barrier	Article 9.d
27.	Stairs and Ladders	Article 9.d
28.	Installation Security	Article 9.d
29.	Electrical Security	Article 9.d
30.	Safety in Transmission and Distribution	Article 9.d
31.	Safety in Generator	Article 9.d
32.	Safety in Distribution Panel, MCC	Article 9.d
33.	Safety in Switchgear	Article 9.d
34.	Safety in Switchyard	Article 9.d
35.	Fire Protection	Article 9.d
36.	Mechanical Safeguarding	Article 9.d
37.	Hand Tool	Article 9.d
38.	Safety in Workshop	Article 9.d
39.	Safety on Boats	Article 9.d
40.	Dangerous Substance Management	Article 9.d
41.	Planning and Engineering Management System	Article 9.f
42.	Purchase System	Article 9.g
43.	OSH of Contractor	Article 9.h
44.	Emergency system Management	Article 9.i
45.	First Aid	Article 9.j
46.	First Aid Kit	Article 9.j
47.	Off-job Safety	Article 9.k

These substandard elements were considered as the additional results of observations on documents and procedures related to the operation of power plants and transmission of electrical distribution, including standard operating procedure based on the result of the focus group discussion and self-administered questionnaire.

**Table 5: Design of Element 5 (Evaluation)**

No.	Description of Standard Elements	Articles No.
<b>V.</b>	<b>EVALUATION</b>	
1.	Monitoring, Measurement and Evaluation of OHS and OS Performance	Article 10.a
2.	OSH and OS Inspection	Article 10.b

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3.	Evaluation of Regulatory Compliance	Article 10.c
4.	Incident Management	Article 10.d
5.	Near miss Management	Article 10.d
6.	Fatality Risk Management Program	Article 10.d
7.	Evaluation of OSH and OS Administration	Article 10.e
8.	Internal Audit	Article 10.f
9.	Non-conformance, Preventive and Corrective Action	Article 10.g

Standard elements were arranged based on the Articles number in Mining Safety Management System.

**Table 6: Design of Element 6 (Documentation) and Element 7 (Management Review)**

No.	Description of standard Elements	Article No.
<b>VI. DOCUMENTATION</b>		
6.1	Manual of OSH-MS	Article 11.a
6.2	Document and Record Control	Article 11b,c,d
<b>VII. MANAGEMENT REVIEW</b>		
7.1	Management review	Article 12

## DISCUSSION

**Implementation of Hiradc in PT.X:** Evaluation on HIRADC applied by PT.X has resulted in the level of dangers in the company’s work environment. The level of dangers and risks in PT. X was categorized as HIGH, because or risk factors related to electricity. The steps to manage accidents are in line with the number of accidents because of shift system<sup>3</sup>. The highest risk level in PT.X shows that the dangers and risks are related with the core business of the company i.e. electricity. The effectiveness of controls conducted by PT.X was measured by percentage of the activity, yet the controls should be developed in accordance with scientific methods.

**Gap between OSH-MS and Mining Safety Management System:** Gap analysis was conducted to assess the compliance to Indonesian Mining Safety Management System. The evaluation was based the Indonesian Mining Safety Management System assessment method which refers to Attachment II of the Regulation of Ministry of Energy and Mineral Resources

No. 38 Year 2014 and compared to Relative Importance method to describe the level of priority in compliance to regulations. <sup>4</sup>

From the observation on Indonesian Mining Safety Management System compared to OSH-MS PT.X, there was 85% gap, which meant that PT.X was in need to follow up the non-conformities that occur from the core elements to sub-elements.

**Design of Standard Elements Of OSH-MS of PT.X:** Overall, Operational Safety was the most important and significant aspect in Indonesian Mining Safety Management Program.

**Policy and Planning:** Work plan and budget of OSH and OS are the only elements that should be designed since the element has not been listed in the previous OSH-MS. The preparation was in line with Indonesian Mining Safety Management System, article 7e, on work plan and budget of mining safety system.<sup>1</sup>

Article 10 Section 4 Point C stated that occupational health and safety planning implementation should be supported with adequate budget<sup>5</sup>.

### Organization and Personnel

**Organizational Structure:** Organizational structure has been listed on Indonesian Mining Safety Management System, article 8a, on planning and establishment of organizational structure, duties, responsibilities, and authority<sup>1</sup>.

In line with Major Labor Laws No. 13 Year 2003, Article 87 section 1, OSH-MS is part of company management system, which comprises of organizational structure, planning, implementation, responsibilities, procedure, process, and resources. These elements are needed for policy development, compliance, analysis, and maintenance on occupational health and safety to control risks related to work activities in order to establish a safe, efficient, and productive workplace.<sup>6</sup>

According to Government Regulation No. 50 Article 12, section e, continued in Article 13, it is stated that OSH information should be made available for every employee. To achieve that, a clear organizational structure is needed.<sup>5</sup>

**Appointment of Operational Responsible Person:** Appointment for Operational Responsible Person has

been listed on Indonesian Mining Safety Management System, article 8c. It is in line with OHSAS Clause 4, element 4.4, and sub element 4.4.2 stating that setting the role, responsibilities, and accountability to facilitate the effectiveness of management system can be accomplished by appointing Operational Responsible Person, which is necessary in Mining Safety System<sup>7</sup>.

**Organizational Structure of OSH and OS Section:**

Organizational Structure of OSH and OS Section has been listed on Indonesian Mining Safety Management System, article 8d, on formation and appointment of OSH and OS of Mining. It is in line with OSH-MS, article 10 section 4a stating that organization/units are responsible for their OSH. Related to Operational Safety, OSH-MS article 10, section 4c has listed standard operation procedure, as well as information, reporting and documentation procedure.<sup>1</sup>

**Appointment of Operational Superintendent and Technical Superintendent:**

Appointment of Operational Superintendent and Technical Superintendent has been listed on Indonesian Mining Safety Management System, article 8e on appointment of operational superintendent and technical superintendent. It is in line with OSH-MS Article 14 section 1 stating that employers are required to supervise and evaluate OSH in their company

Appointment of operational superintendent and technical superintendent is necessary to be included in Mining Safety Management System.

**Appointment of Specialized Technical Staff:**

Appointment of specialized technical staff has been listed on Indonesian Mining Safety Management System, article 8f, on Appointment of specialized on mining technical staff. It is in line with OSH-MS Article 10 section 3b stating that authorization in OSH should be equipped by work permit from authorized institution.<sup>1</sup>

**Administration of OSH and OS:** Administration of OSH and OS has been listed on Indonesian Mining Safety Management System, article 8l, on Administration Management of OSH and OS. In line with OHSAS element 4.4.4 on documentation, all documents related to occupational safety should be filed. Furthermore, element 4.4.5 mentioned that required documents for OSH-MS and OHSAS standard must be controlled.

**Implementation:** The design of the element is unique since all the standard elements of electricity especially

power plants and distribution transmissions are listed in the design. The aspects are included in electrical safety aspects, including the dangers of Arc Flash and other electrical aspects<sup>8</sup>.

**Open Hole:** Open hole has been listed in Indonesian Mining Safety Management Program, Article 9a, on Operation Management Implementation<sup>1</sup>.

Open hole is an operational work that must be done in mining area.

That is in line with FCX 01- Open Hole Policy stating that any excavation work resulting in open hole must include a warning sign to inform workers about the excavation work in the area.

**Coal Handling:** Coal handling has been listed in Indonesian Mining Safety Management Program, Article 9a, on Operation Management Implementation<sup>1</sup>.

This in line with OSHA 29CFR 1926.555 and OSHA 49CFR Chapter 2, describing that any work related to coal are hazardous due to the dust and other dangers. It is important to notice any handling such as personal protective equipment, shift change time, as well as operational management to protect workers and work tools<sup>9</sup>.

**Occupational Health and Environment Management:**

Occupational Health and Environment Management has been listed in Indonesian Mining Safety Management Program, Article 9b and 9c, on Occupational Health Management Implementation and Mining Operational Safety Management Implementation<sup>1</sup>.

It is in line with Act No. 13 Year 2003 Article 71 section 2 point c stating that work condition and environment should not interfere with physical, mental, social, and learning time in school. Work environment should not restrict occupational health. Occupational health is the responsibility of employers<sup>6</sup>.

**Evaluation**

**Evaluation of Regulatory Compliance:** Evaluation of Regulatory Compliance has been listed in Article 10.e. of Indonesian Mining Safety Management System concerning Evaluation of Regulatory Compliance. The evaluation is in line with OHSAS element 4.5.2 concerning evaluation of compliance, or in line with the commitment of organization to comply, the organization should establish, implement and maintain procedures to evaluate their compliance with relevant regulation.

**Evaluation of Administration of OSH and OS:** Evaluation of Administration of OSH and OS has been listed in Article 10.e. of Indonesian Mining Safety Management System concerning Evaluation of Mining Safety Administration Management <sup>1</sup>.

**Source of Funding:** This research is self funded

**Ethical Clearance:** The Ethical Clearance was obtained from the Committee of Ethical Research No. 038/EC/FKM/2018 on 25 April 2018.

## CONCLUSION

From the research, it can be concluded that:

1. Hazard and risk related to all work in PT.X have been identified and all risk has categorized based on the level of risk. Control measures have been established and performed consistently starting from the highest risk level to the lowest level of risk, so that the design of the standard elements created can be directly integrated to the results of HIRADC process
2. Compliance level of OSH-MS standards implemented by PT.X to Indonesian Mining Safety Management System was 85%, which can be categorized as SATISFACTORY, or based on the regulation of Ministry of Energy and Mineral Resources MINERBA, the compliance level has been certified as SILVER.
3. Design of element and sub-element standard for OSH-MS PT.X is in line with the regulation of Indonesian Mining Safety Management System, from five elements to seven elements. The additional elements were Organization and Personnel (Element 3) and Documentation (Element 6). Several sub-elements were merged into a new element based on the requirements from Indonesian Mining Safety Management System as well as PT.X operation in electricity.

## RECOMMENDATION

The design of OSH-MS conforming Mining Safety Management System should be consistently applied and reviewed for its elements and sub-elements along with the conditions of companies operating in mining.

**Conflict of Interest:** The Authors declare no conflict of interest in this article.

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# The Correlation between Regulation Understanding by Inter-Professional first 1000 days of Life Health Workers and the Acceleration of Toddler Stunting Prevention

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## ABSTRACT

Promoting exclusive breastfeeding, infant and young child feeding (IYCF) practice are strategies to solve and prevent stunting. However, in fact, this effort does not yet achieve the expected target. Regulations on exclusive breastfeeding and IYCF have been provided and widely socialized so far. This study aims to analyze the correlation between regulation understanding (focusing on exclusive breastfeeding and IYCF) by inter-professional health workers collaboration and the implementation of stunting prevention in urban areas. Observation based study with mixed method using cross sectional design was performed in Surabaya city (33 primary health care centers) and Sidoarjo district (13 primary health care centers), during September-December 2017. The subjects of 199 health workers were selected purposively. The data were collected through interview using structured questionnaire combined with Focus Group Discussion (FGD). Then, the data were evaluated using descriptive and contingency coefficient analysis. The understanding of regulation by inter-professional health workers on the exclusive breastfeeding and IYCF varied with average of 76.4% and 63.6%, respectively. The implementation of this regulations by the inter-professional health cares did not yet in line with the condition of stunting program prevention. However, the performance synergism of multisector institutions and the cross profession to achieve the exclusive breastfeeding target was stronger than that of IYCF. According to contingency coefficient analysis ( $p < 0.05$ ), good understanding, well-organized documents availability, and the regulation conformity by health workers significantly correlated with the implementation of exclusive breastfeeding regulation. Good understanding of health workers on exclusive breastfeeding and IYCF regulations is a key factor in the practical collaboration of inter-professional health workers to educate people to achieve the target and to implement the cross sectional programs to prevent toddler stunting.

**Keywords:** *regulation; coloboration; inter-professional; stunting*

## INTRODUCTION

The implementation of the accelerated program of nutrition improvement through the rescue movement of the first 1000 days of life in Indonesia, is one of the efforts to achieve the target of SDGs. The achievement of the SDGs targets can only be done if the majority of policy concern are given to the nutritional improvement (Input, Output) on sustainable development. According to The National Team for The Acceleration of Poverty Reduction (TNP2K) in 2017<sup>(1)</sup>, the first 1000 days of life program has not shown encouraging results such as lack of integration planning, budgeting implementation,

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service, monitoring and evaluation, as well as the lack of common purpose and agreement of the importance of handling the first 1000 days of life issue. Similarly, policy and intervention programs as effectively stunted because policy and regulation related to stunting intervention have not been maximally used as a common ground for handling stunting.

Stunting in children is the most fundamental challenge in the world to promote development<sup>(2)</sup>. Childhood stunting, being short for one's age, has life-long consequences for health, human capital and economic growth<sup>(3)</sup>. In Indonesia, stunting prevalence of children under five are 37%. Promoting exclusive breastfeeding and IYCF are strategies to solve and prevent stunting. However, in fact, this effort does not yet achieve the expected target. Regulations on exclusive breastfeeding and IYCF have been provided and widely socialized so far.

Both regulation and policy related to the first 1000 days of life, particularly regulation on exclusive breastfeeding and IYCF, are available in form of rules: Laws, Health Ministerial Decree as well as Regional Regulation. The rules are: Law No. 36/2009 concerning health, Government Regulation (Government Regulation No. 33/2012 about exclusive breastfeeding), and Health Ministerial Decree RI No.450/Menkes/SK/IV/2004 about exclusive breastfeeding in Indonesia; and Provincial Government Regulation of East Java No 11/2011 about nutrition improvement<sup>(4)</sup>. However, the main challenges to execute the nutrition policy<sup>(5)</sup> are the coordination complexity inter and intra sectors, the lack of concern of decision makers about scale and the impact of nutrition problem on socioeconomic as well as for the next generation growth, and lack of social pressure and advocacy leading to low commitment.

The challenges as previously mentioned give impact directly and indirectly on the achievements of nutrition improvement, which are not optimum yet such as the implementation on exclusive breastfeeding and IYCF. The earlier implementation on breastfeeding initiation is accounted as 50% out of total given birth mothers and 65% of the infants get less than 6 months

exclusive breastfeeding<sup>(6)</sup>. This study aims to analyze the correlation between regulation understanding (focusing on exclusive breastfeeding and IYCF) by inter-professional health workers collaboration and the implementation of stunting prevention in urban areas.

## METHOD

Observation based study with mixed method using cross sectional design was performed in Surabaya city (33 primary health care centers) and Sidoarjo district (13 primary health care centers), during September-December 2017. The subjects of 199 health workers (head of primary health care unit, medical doctor, nutritionist, midwife, and others health workers) were selected purposively. The data were collected by interview using structured questionnaire and combined with focus group discussion (FGD).

Data collection was performed by trained enumerator and inspected by investigator team work. The data were collected through surveillance to health workers, and then FGD was conducted on them. The data were further analysed descriptively using frequent distribution, presented in tables and narations. The correlation between variables was performed with contingency coefficient. Ethical clearance was obtained from the ethics committee of Faculty of Public Health, Universitas Airlangga, no 503-KEPK.

## RESULTS AND DISCUSSION

The characteristics of health workers selected for this study were presented in Table 1. The average age of both planner (head of primary health care unit) and program executor (medical doctor, nutritionist, midwife, and others health workers) were 39.6 years old. The head of primary health care unit as planner, around 48.9 years old; and medical doctor, nutritionist, midwife and other health professionals as program executor, around 37.7 years old. Most of the selected health workers were female, with the education level of BSc and medical doctor (72.7%) for planner, and D3/D4 for nutritionist, midwife, and others.

**Table 1: Characteristics of Health Workers**

Variable	Head of Primary Health Care Unit	Medical Doctor	Nutritionist	Midwife	Other Health Professionals	Total
Age (years)	48.9 ± 6.2	38.3 ± 7.2	42.2 ± 9.4	36.8 ± 9.6	33.3 ± 9.8	39.6 ± 9.9



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<b>Gender</b>						
Male	8 (24.2%)	3 (9.4%)	11 (31.4%)	0 (0)	4 (20%)	26 (13.2%)
Female	25 (75.8%)	29 (90.6%)	24 (68.6)	77 (100%)	16 (80%)	171 (86.8%)
<b>Education Level</b>						
D1	0 (0)	2 (5.7)	0 (0)	0 (0)	0 (0)	2 (1)
D3/D4	0 (0)	0 (0)	25 (71.4)	74 (96.1)	9 (40.9)	108 (54.3)
Bachelor (BSc)	24 (72.7)	26 (81.3)	8 (22.9)	2 (2.6)	13 (59.1)	73 (36.7)
Graduate (master)	9 (27.3)	6 (18.8)	0 (0)	1 (1.3)	0 (0)	16 (8)

**Regulation and Understanding:** In general, policies that become national programs will be strengthened institutionally with local regulations. The regulation and policy related to the first 1000 days of life, especially regulation on exclusive breastfeeding and IYCF are provided in 19 regulations in different level such as Laws, Health Ministerial Regulation, Health Ministerial Decree as well Government Regulation. If traced further, not all region follow up the Presidential Regulation No 42/2013 about the Movement of the first 1000 days of life. East Java is the only province in Indonesia that has a Provincial Government Regulation for the nutrition improvement, and the district of Sidoarjo is also the first district that has a Regional Regulation No 1/2016 concerning nutrition improvement and exclusive breastfeeding<sup>(7)</sup>. Among 19 regulations, 14 regulations (8 on exclusive breastfeeding and 6 regulations on IYCF) were asked to health workers regarding to their understanding, documentation, reading and implementation.

**The knowledge of regulation on exclusive breastfeeding:** The knowledge of health workers on exclusive breastfeeding regulation is presented in Table 2. Government regulation no. 33/2012 on Exclusive Breastfeeding regulation and Law No. 36/2009 on Health, are the most widely known regulations by the subjects (health workers). Regulations on exclusive

breastfeeding such as Government regulation no. 3/2012 (Exclusive breastfeeding), Health Ministerial Decree RI No. 15/2013 on provision of nursery facility, Kepmenkes RI no.450/Menkes/SK/IV/2004 on exclusive breastfeeding to infant in Indonesia, are well known by head of primary health care unit, nutritionist and midwife. Other regulations known by the health workers particularly in Sidoarjo district is Regional Regulation Sidoarjo District no. 1//2016 on nutrition improvement and exclusive breastfeeding.

**Documentation of Regulation on Exclusive Breastfeeding:** Based on the documentation, more than 50% subjects did not have the document about exclusive breastfeeding regulation. Among the subjects who told that knowing well and have the document regulation, regrettably they couldn't showed the document. Among the regulations which were well known by the subjects (Government Regulation No. 33/2012 on Exclusive Breastfeeding), only 30% of the health workers could showed the document.

Among 8 regulations as shown in table 2, the most frequently read and implemented regulations by the subjects were Government Regulation no. 33/2012 and Law no. 36/2009. Between those regulations, Government Regulation no. 33/2012 was the most widely known regulations, available documents, reads, and implemented by health personnel.

**Table 2: The Health Workers Who Knew the Exclusive Breastfeeding Regulations**

<b>Regulation</b>	<b>Head of Primary Health Care Unit</b>	<b>Medical Doctor</b>	<b>Nutritionist</b>	<b>Midwife</b>	<b>Other Health Professionals</b>	<b>Total</b>
Government regulation (PP No. 33/2012)	26 (83.9)	18 (56.3)	32 (91.4)	61 (85.9)	18 (81.8)	155 (81.2)
Health Ministerial Decree RI No. 15/2013	24 (77.4)	12 (37.5)	25 (71.4)	52 (73.2)	13 (59.1)	126 (66)

Conted...

Health Ministerial Decree RI No. 450/Menkes/SK/IV/2004	22 (71)	11 (34.4)	26 (74.3)	49 (68.1)	13 (59.1)	121 (63)
Ministerial regulations on women's empowerment and child protection RI No. 3/2010	18 (58.1)	8 (25)	21 (60)	40 (54.1)	5 (25)	92 (47.9)
Law No. 36/2009 about health	28 (90.3)	19 (59.4)	29 (82.9)	62 (84.9)	15 (75)	153 (80.1)
Presidential Regulation No. 42/2013	19 (61.3)	5 (15.6)	22 (62.9)	41 (56.2)	5 (25)	92 (48.2)
Health Ministerial Decree RI No. 25/2014	18 (58.1)	11 (34.4)	22 (64.7)	44 (61.1)	7 (35)	102 (54)
Health Ministerial Decree RI No.15/2014	19 (61.3)	9 (28.1)	23 (65.7)	43 (59.7)	8 (40)	102 (53.7)

Based on the contingency coefficient study, there is a significant correlation ( $p < 0.05$ ) between knowledge, availability of document, regulations read, and the implementation of exclusive breastfeeding regulations. This result supports the urgency of regulation socialization, document provision physically, regulation that can be read by health personnel so the regulation can be optimally implemented.

**IYCF regulation knowledge:** About 6 regulations were asked to health workers (subjects). There were fewer subjects who knew the IYCF regulation compared to the exclusive breastfeeding one (Table 3). As shown in the table, less than 50% subjects knew the IYCF regulation. Among 6 regulations asked, only Health Ministerial Decree RI no. 39/2013 about infant formula milk and other products was known by half of the subject especially head of primary health unit, nutritionist, and midwife.

As shown in table 3, more than 60% of the subjects did not have the document of IYCF regulation. Among the health workers possessing the regulation document, less than 15% of them could show the document. The document shown by 11% of the health workers was Health Ministerial Decree RI No. 39/2013 about infant formula milk and other products, and Health Ministerial Decree RI No. 224/2007 about technical specification on complementary food.

There is less than 30% of the health workers have read the IYCF regulation. This regulation was most widely read by nutritionist. Overall, IYCF regulation which was most widely read by health workers was Health Ministerial Decree RI No. 240/MENKES/

PER/V/1985 about breastfeeding meanwhile, the IYCF regulation which was most widely read by nutritionist was Health Ministerial Decree RI No. 224/2007 about technical specification on complementary food.

The IYCF regulation was more implemented by nutritionist than other health professionals. The most implemented regulations were Health Ministerial Decree RI No.39/2013 about infant formula milk and other products, Health Ministerial Decree RI No. 240/MENKES/PER/V/1985 about breastfeeding substitution, and Kepmenkes RI No. 224/2007 about technical specification on complementary food.

Based on the contingency coefficient test, there was a significant correlation ( $p < 0.05$ ) between knowledge, document availability, regulations read, and the implementation of IYCF regulation. This result also supports the urgency of regulation socialization, document provision, and regulation reading to achieve optimum implementation of IYCF regulation.

The understanding of regulation by inter-professional health workers on exclusive breastfeeding and IYCF varied with average of 76.4% and 63.6%, respectively. The implementation of these regulations by these inter-professional health workers did not yet in line with the condition of stunting program prevention.

According to contingency coefficient analysis ( $p < 0.05$ ), good understanding, well-organized documents availability, and the regulation conformity by health workers significantly correlated with the implementation of exclusive breastfeeding regulation.

**Table 3: The Health Workers Who Knew the IYCF Regulations**

Regulation	Head Primary Health Care Unit	Medical Doctor	Nutritionist	Midwife	Other Health Professional	Total
Health Ministerial Decree RI No. 240/MENKES/PER/V/1985	15 (48.4)	7 (21.9)	19 (54.3)	36 (51.4)	8 (40)	85 (45.2)
Health Ministerial Decree RI No. 39/2013	17 (54.8)	7 (21.9)	22 (62.9)	41 (55.4)	9 (45)	96 (50)
Health Ministerial Decree RI No. 49/2014	15 (48.4)	8 (25)	20 (57.1)	33 (45.2)	8 (36.4)	84 (43.5)
Health Ministerial Decree RI No. 51/2016	12 (38.7)	7 (21.9)	16 (47.1)	31 (42.5)	3 (15)	69 (36.3)
Health Ministerial Decree RI No. 237/Menkes/SK/IV/1997	13 (41.9)	7 (21.9)	18 (52.9)	30 (40.5)	3 (15)	71 (37.2)
Health Ministerial Decree RI No. 224/2007	13 (41.9)	7 (21.9)	19 (54.3)	39 (52.7)	6 (30)	84 (43.8)

**The commitment of multisectoral and intra professional institutions:** Table 4 shows the health workers commitment at planner and executor levels. Most of the planners and the executors have strong commitment to achieve the target of exclusive breastfeeding, early initiation of breastfeeding, and IYCF.

More than 50% of the health workers both at planner and executor levels showed very strong commitment

to achieve exclusive breastfeeding, early initiation of breastfeeding, and IYCF targets. While, more than 1/3 of the health workers have strong commitment. As shown in the table, the commitment to achieve exclusive breastfeeding target was stronger as compared to both early initiation of breastfeeding and IYCF targets. The performance synergism of multisector institutions and the cross profession to acheive the exclusive breastfeeding target was stronger than that of IYCF.

**Table 4: The Commitment of Health Workers on Exclusive Breastfeeding, Early Initiation of Breastfeeding, and IYCF**

Variables	Head of Primary Health Care Unit	Medical Doctor	Nutritionist	Midwife	Other Health Professionals	Total
<b>The commitment to achieve exclusive breastfeeding target</b>						
Very strong	23 (69.7)	22 (68.8)	24 (68.6)	40 (51.9)	11 (50)	120 (60.3)
Strong	9 (27.3)	9 (28.1)	11 (31.4)	34 (44.2)	11 (50)	74 (37.2)
Moderate strong	1 (3)	1 (3.1)	0 (0)	3 (3.9)	0 (0)	5 (2.5)
<b>The commitment to achieve EARLY INITIATION OF BREASTFEEDING target</b>						
Very strong	21 (63.6)	19 (59.4)	17 (48.6)	37 (48.1)	12 (54.5)	106 (53.3)
Strong	9 (27.3)	10 (31.3)	14 (40)	38 (49.4)	10 (45.5)	81 (40.7)
Moderate strong	3 (9.1)	3 (9.4)	4 (11.4)	2 (2.6)	0 (0)	12 (6)
<b>The commitment to achieve IYCF target</b>						
Very strong	18 (54.5)	19 (59.4)	22 (62.9)	34 (44.2)	13 (59.1)	106 (53.3)
Strong	11 (33.3)	10 (31.3)	12 (34.3)	37 (48.1)	9 (40.9)	79 (39.7)
Moderate strong	4 (12.1)	3 (9.4)	1 (2.9)	6 (7.8)	0 (0)	14 (7)

More than 50% of the health workers both at planner and executor levels showed very strong commitment to achieve exclusive breastfeeding, early initiation of

breastfeeding, and IYCF targets. While, more than 1/3 of the health workers have strong commitment. As shown in the table, the commitment to achieve exclusive

breastfeeding target was stronger as compared to both early initiation of breastfeeding and IYCF targets. The performance synergism of multisector institutions and the cross profession to achieve the exclusive breastfeeding target was stronger than that of IYCF.

### CONCLUSIONS

Good understanding of health workers on exclusive breastfeeding and IYCF regulations is a key factor in the practical collaboration of inter-health workers to educate people to achieve the target and to implement the cross sectional programs to prevent toddler stunting. The equal commitment of all health professionals on breastfeeding-related policies as well as regulations is urgently needed to achieve optimal target of stunting prevention acceleration.

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**Ethical Clearance:** This analysis was aGovernment Regulationroved by the Ethics Committe of Faculty of Public Health Airlangga University and all patients gave their written informed consent.

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# Cadres Outreach Program to Mothers Improve Nutritional Status of Under Two Year Old Children

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## ABSTRACT

After exclusive breastfeeding period, complementary feeding is the key elements for under two year old children growth. The lack of nutritious complementary feeding can result in growth failure. This research aimed to improve the nutritional status of under two children through cadres outreach to mothers in providing nutritious complementary food. This quasi experimental study was done at the working area of Puskesmas Genuk, Semarang City, Indonesia. Forty pairs of mother-children under-two in each of two neighborhood area were recruited in the study, as the intervention and control groups. Thirty four pairs in the intervention group, and 32 pairs in the control group finished the study. Ten cadres were trained in providing nutritious complementary feeding foods practices for under-two children. Every cadre outreached 2 mothers in the intervention group for two month period. Data collection was conducted by interviews using structured questionnaires. Weight measurements were done at baseline and at the end of the study. Preceding the study, the average age, weight, WAZ (weight for age Z scores), breastfed status, socioeconomic status between the groups were comparable, but not for gender. There were higher weight changes ( $0.4 \pm 0.31$  vs  $0.2 \pm 0.19$ ) kg and WAZ ( $0.1 \pm 0.95$  vs  $-0.2 \pm 0.18$ ) in the intervention compared to the control group. After controlled for gender, WAZ change was still better in the intervention group. There was no difference in mothers' knowledge on nutrition, but there were better attitude toward nutritious feeding practice, better food preparation sanitation and feeding practice scores in the intervention group after two months. It was concluded that cadres' outreach to the mothers for two months increased growth of under two year old children through a better complementary feeding practice and food preparation sanitation.

**Keywords:** *complementary feeding, outreach, cadre, WAZ, feeding practice*

## INTRODUCTION

Stunting prevalence was very high in Indonesia. Riskesdas data showed that the prevalence of stunting was 37.2%.<sup>1</sup> Although it has already decreased in 2018 to 30.8 %, this level was still to high. <sup>2</sup>Studies has shown that stunting prevention was the most sensitive if it was

done during the first 1000 days of life. <sup>3,4</sup> In Indonesia, intervention during pregnancy has been done through some programs, however many problems still occurred, thus the low birth weight still a problem. Therefore, to prevent stunting, intervention to children after deliveries until two years old should be done to prevent stunting, as this is the best time to do the intervention. <sup>5</sup> Furthermore the growth of under two children will also affect the longitudinal growth after this period. <sup>6</sup>

Studies has shown that outreach and education program are needed, instead of supplementation only, for the women in urban area, to improve the nutritional status of the children. <sup>7</sup> Therefore this study will be conducted through an outreach program. Moreover, to

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increase the nutrition program sensitivity, empowerment to the community is one of the key factors.<sup>8</sup> Therefore, this study was conducted through training the cadres, who were part of the community. The cadres then empowered the the mothers of under two children through an outreach program. The nutritional status improvement was the target of the study.

## METHOD

This quasy experimental study was done in the working area of Genuk Primary Healthcare Center, Semarang, Central Java, Indonesia. Eighty pairs of mothers and their under two year old children were recruited from the *posyandu* in two areas of neighborhood (40 pairs in each group) , which has the similar characteristics in general. One area was chosen as the intervention group and the other area was used as the control group. At the end of the study, 34 pairs in the intervention group and 32 pairs in the control group stayed in the study. They were followed up for two months after the intervention started.

In the intervention groups, the mothers were outreached by health cadres. The health cadres were gathered and trained by the researchers. They were taught about the importance of nutrition for the health of under two children, what are the nutrient requirements for under two children and how to give them nutritious food, including the recipes and demonstration on how to cook complementary feeding to under two children. They also received handbook about the training materials. Then, they were asked to gathered the mothers once a month to provide them with communication, information and education about nutrition for under two children, including the demonstration on how to cook several nutritious complementary feeding for under two year old children. Every health cadres also visited two pairs of mother and child every week to follow up the message and look after the growth of the children, in the first month. After that, they were visited every months. If the mothers had questions regarding the nutrition, health cadres tried to help with their knowledge. The control group did not received this kind of intervention.

At the beginning of the study, data on characteristics of the subjects were gathered by interviews to the mothers using structured questionnaires. Data on food consumption were also gathered during the study. At baseline, one month and two months after

the intervention, anthropometric measurements on weight and height were also done. Children weight were weighed by a digital scale until the nearest 0.1 kg in a standardize procedures. WAZ scores were then calculated using WHO Anthro calculator software. Some additional variables related to feeding practice behavior were also collected at the end of the intervention. The additional variables included mother's knowledge about nutrition and complementary feeding, maternal attitudes in feeding, frequency of feeding each day, hygiene and feeding practice.

Then, data were checked on their distribution. After cleaning and coding, data were compared between baseline and after the intervention in each group and the changes between the intervention and the control groups. Data on weight at baseline was normally distributed, but weight at after intervention and weight changes were not normally distributed. Independent t-tests were used for comparing normally distributed data and Wilcoxon test were used for non normally distributed data. Chi square tests were used for comparing categorical data. Logistic regression was also used for controlling the WAZ score changes by gender difference between the groups.

## RESULTS AND DISCUSSIONS

The characteristic data in the intervention and control groups were listed in Table 1. There was no difference in age, mothers' education level, mothers' working status, family income and breastfed status between the groups. However, the control group has more boys, while the intervention group has more girls.

Table 2 shows the weight and WAZ scores of the subjects at baseline. There was no difference weight and WAZ between the groups at baseline. Thus, the subjects were at the same condition at the beginning of the study.

Table 3 shows the weight and WAZ Scores data after 2 months of intervention in the intervention and control groups. There were significant difference between the groups in weight after the intervention, but not in WAZ scores. The control group had higher weight compared to the intervention group.

Table 4 shows the comparison between the groups in weight and WAZ score changes. The weight changes in the intervention group was higher than the control group. WAZ scores was decrease in the control group, but increase in the intervention group. In these period of

age, (6 to 24 month old) studies showed that children in low and middle income countries were delivered at low WAZ and falters until 2 years old. Thus, the window of opportunity for intervention is at this age. <sup>5</sup> Thus, without

intervention, WAZ scores of the children in Indonesia generally decrease. The intervention should be done before 2 years old to prevent decrease in WAZ scores which in turn will also lead to a decrease in HAZ scores.

**Table 1: Characteristics of the subjects**

Variables	Control (n = 32)	Intervention (n = 34)	p-values <sup>s</sup>
Mean age (months)	12.6 ± 3.81	14.2 ± 5.02	0.204
<b>Sex</b>			
Boys	17 (53.1)	11 (32.4)	0.048
Girls	15 (46.9)	23 (67.6)	
<b>Mothers' education level</b>			
Junior High or lower	5 (40.6)	4 (22.7)	0.543
Senior High School or higher	27 (59.4)	18 (77.3)	
<b>Mothers' working status</b>			
Working	7 (36.8)	4 (18.2)	0.161
Not working	12 (63.2)	18 (81.8)	
<b>Family's income</b>			
Lower than regional minimum level	18 (56.3)	11 (50.0)	0.430
The same or higher than regional minimum level	14 (43.7)	11 (50)	
<b>Breastfed status</b>			
Not breastfed	9 (28.1)	8 (30.7)	0.478
Breastfed	23 (71.8)	26 (69.2)	

<sup>s</sup>Chi Square tests

**Table 2: Anthropometric status of the subjects at baseline (n = 66)**

Variables	Control (n = 32) Mean ± SD	Intervention (n = 34) Mean ± SD	p value
Weight (kg)	10.6 ± 2.48	9.8 ± 2.30	0.118*
WAZ Scores	0.6 ± 1.90	-0.1 ± 1.56	0.434 <sup>#</sup>

\*Independent t-test

<sup>#</sup>Wilcoxon test

After controlled for gender differences in the intervention and control group, WAZ changes still showed the better in the intervention group. By logistic regression analysis, it was shown that the chance of the subjects in the intervention group to have a positive change in WAZ scores was 39.8%, while the chance in the control group was only 12.25%. Among the boys, the chance to have a positive WAZ score change was 14.3% while the chance of the girls was 28.9%. The studies in Ethiopia showed that the boys were tent to

be underweight than the girls , as the boys were more influenced by environmental stress, compared to the girls.<sup>9</sup> This study in Indonesia also showed that girls had shown more benefited from the intervention program.

**Table 3: Anthropometric status after intervention (n = 66)**

Variables	Control (n = 32) Mean ± SD	Intervention (n = 34) Mean ± SD	p value
Weight (kg)	10.8 ± 2.52	10.2 ± 2.32	p<0.001 <sup>#</sup>
WAZ Scores	0.4 ± 1.92	0.1 ± 1.27	0.281 <sup>#</sup>

<sup>#</sup>Wilcoxon test

Table 5 shows the feeding behaviors of the mothers after the intervention, to find out the reason for weight changes in the intervention group at the end of intervention. Mothers' attitude toward feeding nutritious food to their children were better in the intervention group. The food preparation sanitation and feeding practice scores were also better in the intervention group

compared to the control groups. Thus the changes in WAZ scores in the intervention group can be explained by the feeding behaviors of the mothers.

In this study, the subjects were at 5 to 12 month year old, and the effect of intervention was measured in weight and WAZ score changes only. The reason for this was the short period of intervention and the underweight was the first sign to show the growth faltering, which started at this age. At 6-7 months, Indonesian infants start to falter their growth and showed in more underweight (32%), rather than stunting (24%).<sup>10</sup> This study also showed that WAZ scores decreased in the control group from  $0.6 \pm 1.90$  to  $0.4 \pm 1.92$  after two months of follow up, while the intervention group increased their WAZ scores from  $-0.1 \pm 1.56$  to  $0.1 \pm 1.27$ . Therefore intervention at this period of time may prevent or postponed the growth faltering. In the long term, this condition may lead to decrease stunting. As the prevalence of stunting in Indonesia was very high, 37.2% among underfive children, based on 2013' Indonesian Basic Health

Survey (Riskesdas) and 30.8, based on 2018' Indonesian Basic Health Survey.<sup>2</sup>

The factors associated to underweight in developing countries such as Indonesia, included low birthweight status, low sanitation,<sup>11</sup> mothers' feeding practice of to their toddlers.<sup>12</sup> This study also showed that mothers feeding practice in the intervention group was better after the study. Better mothers' feeding practice led to the higher intake of energy, protein and micronutrients, which then resulted in higher weight changes in the intervention group.

Regarding the sanitation, food preparation sanitation was also have an impact on nutritional status as the better food preparation sanitation resulted in lower diarrhea problems.<sup>12</sup> In this study, although diarrhea problem was not measured, but the food preparation sanitation practice was better after the intervention. This condition also explained the better WAZ changes in the intervention group.

**Table 4: Comparisons of the increments between the groups (n = 66)**

Variables	Control (n = 32) Mean $\pm$ SD	Intervention (n = 34) Mean $\pm$ SD	p value <sup>#</sup>
Weight (kg)	$0.2 \pm 0.19$	$0.4 \pm 0.31$	0.027
$\Delta$ WAZ Scores	$-0.2 \pm 0.18$	$0.1 \pm 0.95$	0.048

<sup>#</sup>Wilcoxon test

**Table 5: Mothers' Feeding behavior after the intervention**

Variables	Control (n = 32) Mean $\pm$ SD	Intervention (n = 34) Mean $\pm$ SD	p value <sup>#</sup>
Feeding frequency	$3.2 \pm 0.47$	$3.1 \pm 0.74$	0.426
Mothers' knowledge on nutrition scores	$24.4 \pm 4.47$	$25.6 \pm 5.05$	0.223
Mothers' attitude on feeding practice scores	$8.3 \pm 2.64$	$9.50 \pm 3.79$	0.046
Food preparation sanitation scores	$6.1 \pm 2.0$	$6.9 \pm 1.84$	0.038
Feeding practice scores	$6.7 \pm 1.98$	$8.4 \pm 3.51$	0.043

<sup>#</sup>Wilcoxon test

The children in this study received a low energy and protein before the intervention. In the intervention, good source of protein were introduced and the mothers were motivated to cook their complementary feeding food. In general, the mothers in this study had a good education level. Therefore they can received the information from the cadres very well. This condition led the mothers to have more self efficacy to provide the food to their children.

There was no difference in the nutrition knowledge between the groups. However, the mothers in the intervention group had a better attitude and feeding practice to provide nutritious food for their children. A study in Turkey, has also shown that mothers' nutritional knowledge resulted in a better attitude and feeding practice to their children.<sup>13</sup> Although this study was done on much older children, however, the similar condition



could also be applied on mothers' feeding practice for toddlers. Another study in Kenya showed almost the same results, in which the knowledge of the mothers did not related to the children nutritional status but the mothers knowledge about the health consequences if they did not follow the dietary recommendation was related. <sup>14</sup>Thus, improving mothers knowledge, attitude and feeding practice were very important for increasing the nutritional status of their children.

The results of this study also inline with the results of a systematic reviews which showed that maternal counseling alone resulted on the increase in weight of children at these age (6-24 months), thus recommended to be done in developing countries. <sup>15</sup> This study was done through outreach program by the cadres, which can show an effect on WAZ scores of the children. Thus, the program can be done in a wider area, at least in the urban setting.

The limitation of the study is the limited sample size and the short period of outreach program. Therefore a the larger study and the longer period of outreach program are suggested. The strength of this study was the intervention was given to the cadres, thus the cadres can continue the intervention to the other under two mothers who they met in posyandu. The cadres also have more self efficacy in providing advice to the mothers regarding providing nutritious food to the under two children. Undertwo children are extremely needed for nutritious food for their brain and nerve system development.

The implication of the study: This study can be implemented in a more broader area, by training the cadres and monitoring their work more continuously, so the prevention of stunting and malnutrition can be done.

## CONCLUSIONS

Cadres' outreach program for two months to the mothers of under two children can increase weight and WAZ scores through a better complementary feeding practice and food preparation sanitation.

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**Conflict of Interest:** There is no conflict of interest of the researchers regarding the study and the results.

**Ethical Clearance:** This study has fulfilled the requirement for getting the ethical clearance from the Health Ethical Committee of Faculty of Public Health, Diponegoro University No. 213/EC/FKM/2017.

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# Positive Emotion, Engagement and Meaning of Life of the Elderly in *Pesantren* (Islamic Boarding School)

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## ABSTRACT

Successful aging has been the focus of researcher on elderly since it has been believed that the terminal objective of every human is being a happy and healthy elderly. The aim of the study was to obtain an overview of positive emotion, engagement and meaning of life in the elderly who live as student/santri in Islamic Boarding School. The research was a qualitative method. Techniques to collect data were observation and interview. Variables in the research are positive emotion, engagement and meaning of life. Population of subject was 31 elderly, both male and female. Samples were chosen based on purpose sampling method which consisted of eight elderlies having following criteria: living in Payaman Islamic Boarding School, Magelang, above 60 years old, and healthy (not suffering from any acute nor chronic diseases). Data were analyzed using Interpretative Phenomenology Analysis (IPA). The research shows that social support, gratitude, autonomy and inner peace are the main themes of positive emotion. Engagement, orientation, role of kyai/nyai, and competition in worship are the main themes of engagement. Optimism, self-esteem, self-existence, and akhirah-oriented life are the main themes of meaning of life. Elderly in pesantren has developed positive emotions where they feel comfortable and close to the administrators of pesantren and fellow santri, and fully engaged to activities in pesantren. The more they attached to life in pesantren; they obtained deeper meaning of life. It can be concluded that positive emotion and engagement that were continuously established in pesantren has developed the meaning of life in elderly.

**Keywords:** *Positive Emotion; Engagement; Meaning of Life; Elderly; Islamic Boarding School*

## INTRODUCTION

Getting old is a fate when human has the chance to live long. Entering the phase of getting old, individuals have to be ready to face any changes in their body. Physical, cognitive, social, and psychological degenerations are certain, yet all aspects are related to their lifestyle. In the life of the elderly, the phenomenon of losing a partner is considered normal, especially since the death of a spouse. Whereas mental illness can occur, such as depression, because there are many changes experienced by the elderly, such as feeling lonely due to losing a partner, peers, lack of attention from children,

social isolation, stress due to illness, and retirement<sup>1</sup>. Based on the statement, successful aging has been the focus of researcher on elderly since it has been believed that the terminal objective of every human is being a happy and healthy elderly.

A research based on grounded theoretical framework and supported by interview to 23 elderlies aged 62-88 years old was conducted in Zapopan, Mexico. The aim of that research was to explore the perspective of Mexican adults on successful aging. The result shows that successful aging is a multidimensional concept, which is affected by intrinsic and extrinsic factors. Overall, the definition of successful aging is acceptance and adaptation to transitions and living conditions, strong engagement with family and friends, faith to God, achievement of personal goals, and growing old in one's residence<sup>2</sup>. In addition, high resilience is required by the elderly because the result of this study is significantly correlated to positive results, namely successful aging, lower rate of depression, and long life<sup>3</sup>.

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Elderly is categorized as non-productive group of society. When an individual has categorized into elderly group, generally, the individual had retired from the job and not all of them has earnings. In line with the growing number of elderly population in urban areas, residential areas have become important since elderly spends most of their time at home<sup>4</sup>. A qualitative research conducted on elderly in Banyumanik Housing Complex, Semarang, shows three categories of spaces, namely: micro, meso, and macro and the existing condition i.e. living alone, living with children and grandchildren, living with spouse, and living with spouse as well as children and grandchildren<sup>5</sup>. The result shows that many elderly live with their family.

In contrast, elderly living in *pesantren* (Islamic boarding houses), like in Payaman, Magelang which established in 1930, shows different issues. A research has proposed that *pesantren* has contributed to the formation of social capital, especially in form of religiosity, which also contributes to community wellbeing<sup>6</sup>. In addition to the religiosity, elderly has the opportunity to learn in boarding school. One study stated that lifelong learning for parents can improve their psychological well-being and integrate their skills to achieve a healthy and active aging or known as successful aging<sup>7</sup>.

In a research on a group of elderly, it has been explained that in living life, meaning of life has become important because it forms its subjective well-being, although stable internal resources such as optimism and pessimism affect their subjective wellbeing. On the other hand, subjective well-being has the role as one of the determinants of successful aging<sup>8</sup>. In *pesantren*, elderly are busy conducting their routines. Other research suggested that elderly will be more productive if they focus not only on physical activities but also on their meaning of live to ignite their fitness, considering their limitations on physical activities<sup>9</sup>. In their old age, individuals determine what kind of life they will live. Mentioned in the study, spiritual and meaning of life have become important factors to protect themselves from psychological pressures<sup>10</sup>.

A research stated that Moslem students claim that they are close to God and serving Him makes them have a meaningful life<sup>11</sup>. In *pesantren*, the elderly as *santri* routinely conduct activities of worship, and according to the survey, they have inner peace and comfort because they perform worship freely, without any other activities like when they were not in *pesantren*. As they live in

*pesantren*, they have more experiences that cultivate positive emotions. A study related to emotional aging, such as emotional experiences, emotional regulation, emotional perceptions, emotion-related concerns, and memory, is performed on a group of people of all ages. The result of the research emphasizes multidirectional differences of the final development of life in functional domain. Furthermore, it is important to understand the emotional state of the elderly because it is related to the physical condition and welfare of the elderly<sup>12</sup>.

From a study conducted on elderly individuals in Indonesia and Japan, it shows that what is important for living condition supporting elderly life is security, comfort, health, affordability, independence, and close relationships with the social environment<sup>5</sup>. Elderly living in *pesantren* raise intense ties with other elderly who also live in *pesantren*. Those *santries* live harmoniously, helping each other and sharing stories. This positive stimulation can grow positive emotion in elderly in *pesantren*. The research was conducted on a group of subjects to compare attention bias of 35 subjects of elderly and 35 subjects of middle adult. The stimuli used are expressive faces that feature expressions such as neutral, disgust, fear, and happiness. Compared to younger subjects, the elderly pay more attention to happy faces and tend to avoid frightening faces. These findings confirm that positive stimulus effects, such as a pleasant social environment, can develop positive emotions in the elderly<sup>13</sup>. Positive emotions also develop elderly health and wellbeing<sup>14</sup>.

According to the results of the initial survey, elderly in *pesantren* receive social support from fellow elderly, as well as the board and the kyai of the *pesantren*. Social relations in *pesantren* and the comfort felt by elderly *santri* in *pesantren* stimulate elderly attachment to the life in *pesantren*. From the results of a research, it shows that individuals who attach to an environment will be much involved and learn from the environment, so that individuals will be more creative and able to solve problems independently, meaning that those individuals are more mentally healthy<sup>15</sup>. Another study on group of elderly and people with disability discovered that social participation, attention to them in a social network, form an established and important social bond in fostering their well-being<sup>16</sup>. Social support from significant other is very important for the elderly since it can develop elderly psychological wellbeing<sup>17</sup>.

Positive Psychology is progressing from time to time. The main purpose of positive psychology is to discover our potentials, which will support our productivity. The following constructs: establishing positive emotion, building engagement in an environment, and building meaning of life are parts of positive psychology, have become important especially for the elderly. The aim of the study was to obtain an overview of positive emotion, engagement and meaning of life in the elderly who live as *santri* in Islamic Boarding School.

**METHOD**

The research was a qualitative research. Techniques to collect data were observation and interview. Semi-

structured interviews were conducted to select samples based on purposive sampling method, which consisted of eight elderlies having following criteria: living in Payaman Islamic Boarding School, Magelang, above 60 years old, and healthy (not suffering from any acute nor chronic diseases). Data were analyzed using *Interpretative Phenomenology Analysis (IPA)* to observe how participants construe their personal and social life as well as to explore their experiences. IPA emphasized on construing from the points of view from both participants and researchers.

**RESULTS AND DISCUSSIONS**

**Result:** The following table presents subjects' social-demographic data.

**Table 1: Social-Demographic Data of Subjects (n = 8)**

Subject	Sex	Age	Status of Spouse	Occupation	Length of Stay in Pesantren (Year)	Origin
1	F	65	Passed Away	Entrepreneur	3	Ambarawa
2	F	66	Alive	Homemaker	2	Batang
3	M	78	Alive	Government employee	2	Kebumen
4	M	75	Alive	Entrepreneur	2	Pekalongan
5	F	69	Alive	Homemaker	3	Demak
6	M	76	Alive	Teacher	5	Slawi
7	M	68	Alive	Employee of Finance Dept.	1	Jakarta
8	F	62	Passed Away	Trader	4	Temanggung

The following table presents some main themes from the constructs, which were obtained from interview.

**Table 2: Main Themes from Data of Subjects (n = 8)**

Variable	Main Theme
<b>Positive Emotion</b>	Social supports from others Motivation and thankfulness Autonomy and conducting a healthy life Inner peace
<b>Engagement</b>	Engagement to activities in Islamic Boarding School Orientation of living in Pondok Sepuh The roles of <i>Kyai &amp; Nyai</i> Strive in worship
<b>Meaning of Life</b>	Positive expectancies toward the future Efforts to prove personal existence Self-esteem Orientation to akhirah

**DISCUSSIONS**

Elderly living in *pesantren* have to do challenging daily routines. *Pesantren* is an institution to learn more about Islam. Generally, the students of *pesantren*, or *santri*, consist of children and teenagers. *Pesantren* Payaman Magelang has elderly *santris*, which is unique since elderly are usually reluctant to study and attach to rules of conduct. Elderly also selectively chose their social environment, including living in *pesantren*<sup>18</sup>. This qualitative research involved 4 female elderly and 4 male elderly coming from various jobs and origins. They joined *pesantren* and live a life accompanied by worship routines. The feeling of togetherness has developed positive emotions. From the interview, several main themes were obtained, such as social supports, thankfulness, autonomy and inner peace. In *pesantren*, elderly get social support either from fellow *santri* or from *ustad* and *kyai*. Such support appears as information and religious knowledge, togetherness to share stories, and attention and assistance provided in daily activities.

When positive emotion is formed, spirituality in elderly will also improve<sup>19</sup>. Elderly experience degeneration in various aspects, both physical and psychological, including lower emotional ability like emotional control. Elderly have challenges to control his anger, get sad easily and cry for some life events, and it lasts for a period. So studying this aspect of emotional aging is important to be developed<sup>12</sup>.

The elderly at *pesantren* revealed that they became passionate in living and worshipping. They are thankful because at that age, they are still given the health, strength and opportunity to undergo *pesantren* activities, study and worship. In addition, they formed a healthy lifestyle and self-reliance in *pesantren*, such as being responsible for their needs of clothing and food, and even cleaning the area of boarding schools together with other elderly.

In *pesantren*, the elderly formed inner peace and positive emotion. These aspects are considered the most important aspects, which appear in all subjects. A theory stated that sleep mechanisms plays an important role in the process of emotional regulation<sup>20</sup>. This is evident that one of the evidence of inner peace is that the elderly can sleep soundly every day and their health conditions are maintained. Another research stated that maintaining positive emotion increases elderly's mental and physical health<sup>21</sup>. Furthermore, a research shows that positive emotions is beneficial to reduce, even cure dementia<sup>22</sup>.

The interview revealed that the elderly are happy to be involved in all activities in the *pesantren*, which formed a full engagement of the elderly. The main theme of engagement can be established, that is full involvement, orientation, role of kyai/nyai, and competition in worship. One of the respondents mentioned that he got an additional task in *pesantren*, and it actually formed a positive feeling: needed by his environment. A research mentioned that elderly engagement in productive activities leads to elderly wellbeing<sup>23</sup>. Another study on 2750 elderly respondents mentioned that there were variations of elderly engagement in rural areas. Most of the elderly were reluctant to be actively involved in their environment, unless the engagement were established from local attractions and social supports<sup>24</sup>. In another study mentioned that to survive living in a place of life, elderly needs adequate facilities and social support, to foster elderly social wellbeing<sup>25</sup>. This is contrary to the results of this study, where *pesantren* research

sites have limited facilities, and the reason why the elderly are willing to be fully involved in all *pesantren* activities and to stay in *pesantren* for many years was interpersonal closeness with fellow *santri* and kyai/nyai of the *pesantren*.

A study in China to 14.507 elderly respondents from 393 areas suggests that one of the factors establishing elderly engagement to their environment is social concern to the elderly<sup>26</sup>. Supportive environment condition to do religious activities has stimulated elderly *santri* to compete in worship. The serenity to do worship and increased quality of faith has developed engagement to *pesantren*.

In terms of construing life by elderly in *pesantren*, there are several main themes as the result of the interview, namely, optimism, proving self-existence, self-esteem, and akhirah-oriented life. A research conducted to elderly suffering from cancer suggested eight values of life forming one's meaning of life, namely: comfort, sustainability, humility, dignity, honesty, optimism, hope, and readiness<sup>27</sup>. The result is in line with the findings of the research on elderly in *pesantren*, that optimism develops meaning of life in elderly. Self-esteem and self-existence formed in the elderly is a manifestation of self-dignity, as one of the values of life. Finally, akhirah-oriented life that appears on all respondents indicated that elderly *santri* is emphasized on the increased quality of worship and their faith as the meaning of their life

Being healthy, optimistic and needed by others develop spiritual conditions of individuals and their meaning of life, and in turns, increase individual's quality of life<sup>10</sup>. Elderly subjects in *pesantren* are not prone to chronic and acute diseases because of the meaning of positive life have stimulated their quality of life. The results of the study on elderly suffering from depression shows that the elderly who have hope and meaning of life can minimize the depression<sup>28</sup>

Elderly need an activity and appreciation from the environment to avoid depression. The environment can come from a family or nursing home or *pesantren*<sup>29</sup>. Elderly experience positive emotions in the form of gratitude and inner peace while in the *pesantren*. Furthermore, positive emotions can motivate elderly to engage in *pesantren* activities in *pesantren* including building emotional attachment to fellow elderly *santri* and kyai/nyai, thus creating an environment of competing

in worship. Positive emotions and engagement, which are maintained by the elderly when in boarding school, can develop life optimism, prove personal existence and self-esteem and live an akhira-oriented life.

## CONCLUSIONS

The elderly living in Islamic Boarding School has gained many experiences to develop positive emotions as well as motivate them to engage in every activity in the boarding school. Their positive emotion and engagement lead to meaning of life in elderly.

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# Health Professional's Perception toward Impact of Hospital Accreditation on Quality of Care in Asia: A Systematic Review

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## ABSTRACT

Hospital accreditation is an effective way to evaluate the quality of a hospital and important tool for improving the standard of the hospitals. Due to improve the quality of health services, hospital accreditation should be supported. Accreditation is a long-term process that demands commitment of the entire organization to work together. The health care professionals skepticism about the positive impact of accreditation programs is the most important barrier to implementation that program. This study aims to assess the perceptions of health professionals on the impact of hospital accreditation and implementation of change towards the delivery of quality patient care in Asian countries. We systematically searched five electronics databases from May 14th – 21st 2018, for eligible systematic reviews in Asia region with English for language limitation. Five publications met the inclusion criteria. Findings from the included studies found positive perceptions of health professionals to hospital accreditation impact on improving the quality of health services. These studies have heterogenic variables to explore the health professional perception toward impact of hospital accreditation and quality of care. The implementation of hospital accreditation requires commitment, support, and motivation from government, leadership, and all human resources in the hospital. There are many factors affecting performance of accreditation such as quality of care, leadership, and culture. These factors need strategies to strengthen the way accreditation for improving quality of care, strengthen leadership, and culture. The findings are expected to provide valuable lessons for preparing or implementing accreditation.

**Keywords:** *perception, impact, hospital accreditation, health professionals, nurses*

## INTRODUCTION

According to the World Health Organization (WHO) Regional Office for Europe in 2003 has responded to the highlights of low-quality research and increasing patients' expectations, ensuring the safety of patients and staff and improving the quality has become an important objective for all national health systems in developed and developing countries<sup>(1)</sup>. The Government regulations in developing countries increasingly used hospital accreditation as a tool to guarantee quality of health services<sup>(2)</sup>.

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In the late 1990s The Joint Commission International (JCI) founded to survey hospitals outside of the United States, creates a mark on the world map and increases business through medical tourism<sup>(1)</sup>. For more than 60 years hospitals accredited by JCI, approximately 4,023 general, psychiatric, pediatric, rehabilitation and special hospitals, and 366 hospitals with critical access, through a separate accreditation program<sup>(3)</sup>.

In Asia due to healthcare has become the main focus, efforts are being made to change the healthcare system for better quality of care to make the benchmark the best worldwide. In India the National Association Board for Hospitals and Healthcare Providers (NABH) established for hospital accreditation. The low of standards puts the patient at risk. One of the World Health Organization (WHO) studies showed that the highest incidence of hospital infections in Southeast Asia was at 10%, meanwhile the eastern Mediterranean was at 11.8%, which was the highest<sup>(2)</sup>.

Asian countries are quickly becoming known as medical destinations. A combination of factors, including but not limited to high quality and relatively lower costs, makes it a favorite destination for many international patients<sup>(4)</sup>. Medical tourism has encouraged Asian hospitals to strive for world-class quality standards<sup>(2)</sup>.

Hospital accreditation has been defined as “A self-assessment and external peer assessment process used by health care organizations to accurately assess their level of performance in relation to established standards and to implement ways to continuously improve”<sup>(1)</sup>. The accreditation process is designed to ensure compliance and improvement by encouraging positive and longitudinal changes in organizational and clinical practice, and the goal is to contribute to the production of high quality and safe care for consumer benefits<sup>(5)</sup>. Hospital accreditation is an effective way to evaluate the quality of a hospital and important tool for improving the standard of the hospitals. Accredited hospitals provide high-quality care to their patients also offer an edge over the competition in healthcare sector and strengthen the public’s trust in the quality and safety of care, care and services. Overall hospital accreditation improves risk reduction and risk management, organize and strengthen patient safety efforts and creates a culture of patient safety<sup>(2)</sup>. There is consistent evidences to suggest that hospital accreditation programs improve health care by improved clinical outcomes or a broad spectrum of clinical conditions. That is the reason accreditation programs should be supported as a tool to improve the quality of health services<sup>(6)</sup>.

Accreditation is a long-term process that demands commitment of the entire organization to work together<sup>(7)</sup>. The performance of health sector depends on employee’s motivation, with service quality, efficiency and fairness, all mediated directly by the willingness of the employees to apply their task. Motivation in a work context can be defined as the level of individual willingness to create and sustain an effort toward organizational goals<sup>(8)</sup>. Many factors that influence implementation of hospital accreditation programs, the health care professionals skepticism regarding the positive impact of accreditation programs is the most important barrier to implement that program<sup>(4,5)</sup>.

## METHOD

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement is an evidence-based approach for conducting systematic reviews and meta-analyses that was applied in this systematic review<sup>(11)</sup>.

**Data Sources:** Relevant English language articles published from 2008–2017 were sourced using five databases (EBSCOhost, Google Scholar, Proquest, Sage, and Scopus). Combination of terms were used in multi-field search, relating to perception of health professional (physician, nurses and another health practitioner) on impact of hospital accreditation (quality of care and the perceived contributing factors that can explain change in quality of care).

**Eligibility Criteria:** The eligibility criteria for inclusion were research journal articles that included a perception of health professional on impact of hospital accreditation on quality of care. Eligible studies were restricted to articles with full-texted access published in English within the years 2008 – 2017. Research that were eligible were start from all over the world then narrows to Asian countries. Articles were excluded if they did not meet the above criteria or were theses, systemic review and dissertations. Criteria of exclusion is any study that does not match the above criteria.

**Study Selection and Data Extraction:** Electronic databases were searched during the week of 14–21 May 2018 independently by the authors and collectively screened for duplication. The authors reviewed the titles and abstracts generated by the search engines to assess their eligibility for further review based on the selection criteria, and chose relevant articles for possible inclusion. The following data were extracted from each publication: author(s), publication year, location of study. Publications have heterogenic variables to explore the health professional perception toward impact of hospital accreditation on quality of care. Findings were therefore synthesized in a narrative synthesis around the study objectives.

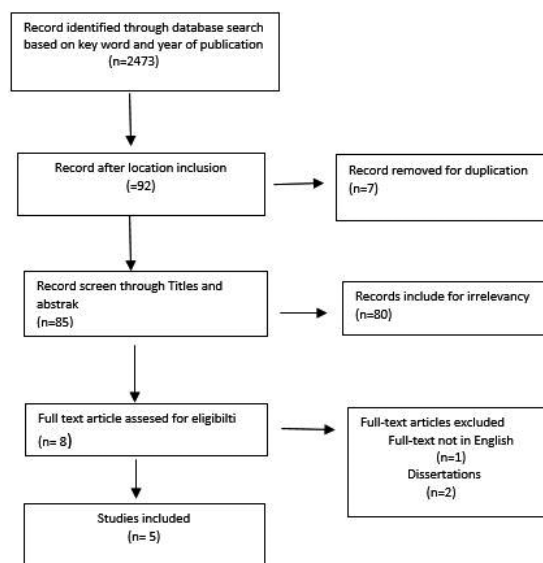


Fig. 1: Prism flow chart

## RESULTS AND DISCUSSIONS

After removing duplications 92 records were identified. Title and abstract screening identified 8 references that potentially fulfilled the inclusion criteria and copies of the full publications were sought. A total of 5 publications fulfilled the eligibility criteria and were included in the reviews.

### Summary of study and findings for comparison:

Husein et al (2017) used cross-sectional survey for their journal "Perception of hospital accreditation among health professionals in Saudi Arabia". The aim of their journal to assess the perceptions of health professionals on the impact of JCI accreditation and implementation of change towards the delivery of quality patient care. The outcome measure(s) of this research by using participation in accreditation, benefits of accreditation, and quality of results of accreditation, and the result of hospital accreditation was given a worthy response from the general view of 901 health professionals <sup>(12)</sup>

Mostafa et al (2014) used a cross sectional for their journal's "Nursing Perception towards Impact of JCI Accreditation and Quality of Care in a Tertiary Care Hospital, Central Saudi Arabia". The aim of their journal were: 1) to assess nurses' perception to JCI accreditation impact, 2) to assess nurses' perception to quality of health care (QHC), and 3) to identify the predictive factors for perception to accreditation and QHC at King Abdulaziz Medical City (KAMC), Riyadh, Saudi Arabia. These research incorporates two domains: degree of staff involvement and benefits of accreditation, the results of 751 nursing personnel surveyed, older and less educated nurses were significantly more likely to report positive perception to accreditation impact. Nurses' perception to accreditation impact was a significant predictor of perception of quality of care. Higher quality of care was more likely to be perceived by the less educated and less experienced nurses, and nurses with direct patient care. The perceived contributing factors that can explain change in quality of care in this research were leadership, commitment and support, use of data, quality management, staff Involvement<sup>(13)</sup>

Fadi et al (2008) used a cross sectional for their journal "The impact of hospital accreditation on quality of care: perception of Lebanese nurses". The aim of their journal to assess the perceived impact of accreditation on quality of care through the lens of health care professionals,

specifically nurses. This paper also investigates the perceived contributing factors that can explain change in quality of care. The result of the high score for the variable 'Quality Results' indicates that nurses perceived an improvement in quality during and after the accreditation process. The perceived contributing factors that can explain change in quality of care in this study were leadership, commitment and support, use of data, quality management, staff Involvement and hospital size. The variable Quality Management, as measured by the scale of Quality Management, had the greatest impact in medium-sized hospitals while the subscale measuring Staff Involvement had the greatest impact in small-sized hospitals <sup>(14)</sup>.

Ahmet et al (2014) used a cross sectional for their journal "Perceptions of nurses on the impact of accreditation on quality of care a survey in a hospital in Turkey". The aim of their journal to investigate perceptions of Turkish nurses on the impact of Accreditation on quality of care and the effect of accreditation on quality results. The result of this research that the nurses had generally high scores for the items concerning the benefits of accreditation. There was a statistically significant positive correlation between the dependent variable (quality results) and the independent variables (benefits of accreditation and participation of employees). Patient satisfaction scores increased after accreditation <sup>(15)</sup>.

Diab et al (2011) used a cross sectional for their journal "The Extent to Which Jordanian Doctors and Nurses Perceive the Accreditation in Private Hospitals". The aim of their journal to know if the doctors and nurses in the Jordanian private hospitals have a perception about the accreditation and to know if there's a different between the doctors and nurses perception and understanding the accreditation standard at their hospitals. The results of this study showed that doctors and nurses have a positive attitude regarding their perception of accreditation standards, with no different between their perception. And the perceived contributing factors that can explain change in quality of care in this study were management and leadership, strategic planning for quality, human resources utilization, quality management, and the accreditation process and implementation <sup>(16)</sup>

All publications use data from 1 Asian country, the relevant publications are predominantly originated from Western Asian countries, 2 from Saudi Arabia, 1 from

Turkey, 1 from Lebanon and 1 from Jordania. The health professionals population from 3 studies were nurses, 1 of this study were doctors and nurses, and the other one were physicians, nurses, medical technologists, dietitians, and other allied healthcare professionals. Five studies provided data regarding positive perceptions of health professionals to hospital accreditation impact on improving the quality of health services and 3 of studies provided predictors data of better quality results. Among 4 studies, 1 study in Turkey compared patient satisfaction before and after hospital accreditation and showed increased satisfaction after accreditation. Five of publications used cross-sectional study design.

### **The Perceived Impact of Accreditation on Quality of Care through the Lens of Health Care Professionals:**

All of 5 studies showed health professionals in 4 Western Asian Countries (Saudi Arabia, Turkey, Lebanon and Jordania) have positive perception of the impact of quality on care.

Of the two studies in Saudi Arabia, one main outcome measure(s) by using participation in accreditation, benefits of accreditation, and quality of results of accreditation, and the result of hospital accreditation was given a worthy response from the general view of 901 health professionals<sup>(12)</sup>. The other one using two previously validated tools of different domains, to assess accreditation impact on Quality Of Health Care(QHC), as perceived by nurses. This tool incorporates two domains: degree of staff involvement domain and benefits of accreditation domain. Of 751 nursing personnel surveyed, older and less educated nurses were significantly more likely to report positive perception to accreditation impact<sup>(13)</sup>.

Study in Turkey showed that nurses had generally high scores for the items concerning the benefits of accreditation. There was a statistically significant positive correlation between the dependent variable (quality results) and the independent variables (benefits of accreditation and participation of employees)<sup>(17)</sup>.

In Lebanon, the high score for the variable quality results indicates that nurses perceived an improvement in quality during and after the accreditation process<sup>(14)</sup>.

Study in Jordania showed perception of doctors and nurses have a positive attitude regarding their perception on impact of accreditation<sup>(16)</sup>.

**The perceived contributing factors that can explain change in quality of care:** Study in Lebanon, Jordania and one of study in Saudi Arabia showed the contributing factors that can explain change quality of care were leadership, commitment and support, use of data, quality management, staff Involvement<sup>(8,11,16)</sup>. Study in Lebanon added hospital size as one of the contributing factors. The variable Quality Management, as measured by the scale Quality Management, had the greatest impact in medium-sized hospitals while the subscale measuring Staff Involvement had the greatest impact in small-sized hospitals<sup>(14)</sup>. Study in Jordania added strategic planning for quality as one of contributing factors<sup>(16)</sup>.

## **DISCUSSION**

Publications regarding health professional's perception toward impact of hospital accreditation and quality of care in Asian countries were limited. Although not all variables investigated in 5 publications have the same variables, all studies showed positive perceptions of health professionals on impact of hospital accreditation to improve quality of services and safety of the care organization.

In this systematic review, the predictors of better quality results of hospital accreditation showed in Lebanon, Jordania and one of studi in Saudi Arabia studies were leadership, commitment and support, use of data, quality management, staff Involvement. Based on study in Lebanon, hospital size include better quality predictors of quality. The study's findings in Lebanon are important because evidence shows that larger organizations are more likely to value and benefit from accreditation whereas smaller organizations may be burdened by surveys and compliance costs compared to their overall budgets. Large hospitals tend to be more hierarchical and bureaucratically organized that make the implementation quality of work more challenging.

Participation in the accreditation process promoted a quality and safety culture that exceeded the organizational boundaries. Insights into employee motivation can be applied to involve employees in promoting learning, overcoming organizational boundaries and improving quality services and safety in healthcare institutions<sup>(18)</sup>. Motivated employees are needed to improve the quality and safety of the care organization. Encouraging and involving employees to participate in the accreditation process is a big challenge<sup>(18)</sup>.

This systematic review reports the evidence of health professionals perception toward impact of hospital accreditation on quality of care in Asian countries from full text studies published in English during the last ten years. Research in the field of health professionals perception are limited in Asia, and notes for further implications of research as results in different settings may differ. The setting of the studies were not homogenous, which may cause confounding bias. Another confounding bias was the fact that the 5 results of the study is based on the perception of health professionals. Only 1 among 5 studies compared patient satisfaction before and after hospital accreditation, while other studies without further analysis of patient outcome data and outcome indicators.

### CONCLUSIONS

The implementation of hospital accreditation requires commitment, support, and motivation from government, leadership, and all human resources in the hospital. The positive perceptions of health care professionals will be motivate health professionals to support the implementation of hospital accreditation. There are many factors affecting performance of accreditation such as quality of care, leadership and culture. These factors need strategies to strengthen the way accreditation for improving quality of care, strengthen leadership, and culture. Researches regarding the impact of hospital accreditation in Asia are still limited, implicating a need for future research. The findings are expected to provide valuable lessons for preparing or implementing accreditation.

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# The Evaluation of Acute Appendicitis Clinical Pathway

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## ABSTRACT

**Introduction:** Acute Appendicitis is the 1<sup>st</sup> emergency case for the abdominal disease in Indonesia. In 2014, Clinical Pathway is one of the requirements that must be met in the hospital's accreditation standards. It is crucial for the hospital having a successful of implementation of clinical pathway as Indonesia run universal health coverage. As the 4<sup>th</sup> year of this regulation, all hospital needs to implement clinical pathway as a tool for variations control. Objects of this research are: 1) how is compliances in acute appendicitis management after using clinical pathway, 2) is clinical pathway successful as a tool to reduce variances.

**Method:** This research used mix methods. A retrospective analysis of medical records (July 2016 - June 2017) was performed. The CP comprised the following indicators of compliance: doctor visit, laboratory tests, medication, anaesthesia consultation, technic of surgery and nutrition. In-depth interview was performed to those who involved in the implementation of CP by purposive sampling technique.

**Results:** There were 35 patients of which 25 (71%) were female and 10 (29%) were male. The compliance to clinical pathway were 37% patient for length of stay (3 days), 29% patient in medication and laboratory tests, 36% patient in anaesthesia consultation, 94% in Open Appendectomy, 100% in doctor visits and nutrition.

**Conclusions:** Compliance to CP of Acute Appendicitis was low especially in medication and laboratory tests. Clinical pathway is unsuccessful as a tool to reduce the variances.

**Keywords:** acute appendicitis; pathway evaluation; pathway implementation; clinical pathway; acute pathway.

## INTRODUCTION

Acute appendicitis is one of the most common diseases emergency cases, with about 250,000 cases in America and 40,000 in the UK per year<sup>1,2</sup>. Acute appendicitis is one disease that has a high prevalence rate. By 2015, in North America the incidence rate reaches 100 per 100,000 people  $\pm$  year with a diagnosis of 400,000 Appendicitis. The incidence of acute appendicitis in developing countries is lower than in developed countries<sup>3</sup>. In Southeast Asia, Indonesia ranks first as the highest incidence of acute Appendicitis with

a prevalence of 0.05%. According to Household Health Survey (SKRT) 2014 in Indonesia, Appendicitis ranked highest among emergency cases of abdomen<sup>4</sup>.

Clinical pathway (CP) was originally intended to shorten the length of hospitalization days and lower the cost of health services. In Japan, CP is also used to standardize medical services and improve patient satisfaction<sup>5</sup>. In acute appendicitis management, CP is an important tool because it has clinical symptoms that vary. Diagnostic of Acute appendicitis is sometimes difficult to do, though by an experienced physician<sup>6</sup>.

In 2014, Indonesia run universal coverage (BPJS) and changed the payment mechanism to health-providers from fee-for-service to case-based-schemes. This mechanism aims to improve health service and health care cost beneficial which CP is one of tools to achieve that. CP is a document that allow all staffs know all aspect in treatment plan<sup>7</sup>.

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Implementation of CP is one of the requirements that must be met in the hospital's accreditation standards in Indonesia<sup>8</sup>. It is crucial for the hospital having a successful of implementation of CP as Indonesia run universal health coverage. As the 4<sup>th</sup> year of this regulation, all hospital needs to implement clinical pathway as one of main subject in quality insurance of health care delivery system. Objects of this research are: 1) how is compliance in acute appendicitis management after using clinical pathway, 2) is clinical pathway successful as a tool to reduce variances.

## METHOD

This study was conducted at one of private hospital in Jakarta. A retrospective analysis of medical records (July 2016 - June 2017) through Hospital Information System (HIS) was performed. The inclusion criteria were: uncomplicated Acute Appendicitis, inpatient surgical patients, age >15 years, elective case. The exclusion criteria were: found comorbidity, complications during treatment, patient is referred to another health service. The Medical Committee developed the CP on Open Appendectomy. Uncomplicated open appendectomy was done for diagnosis of acute appendicitis with ICD-10 code is K35.9.

The CP comprised the following indicators of compliance: length of stay, doctor visit, laboratory tests, medication, pre-anaesthesia consultation, technique of surgery and nutrition. Data were analyzed univariate by using «Pre-Clinical Pathway Development and Clinical Pathway Evaluation Tools version beta 2.6». Data was presented as utilization (average) and percentage which ever were applicable.

## RESULTS AND DISCUSSIONS

Thirty-five patients were included in the study. Sample's characteristics (35 patients) were mean of age was 30.6 years, 29% were male and 71% were female [Table 1].

**Table 1: Sample's characteristic**

Variables	
Age (Mean ± SD)	30.6 ± 11.4
Sex (%, n=samples)	Male (29%, n = 10) Female (71%, n=25)

The compliance of CP presented in percentage shows in table 2, which the highest compliance (100%) was doctor's visits and nutrition. The lowest (29%) was lab test and medication.

**Table 2: CP Compliance**

Variables	CP Compliance (%)
ALOS	37
Doctor's visit	100
Lab test	29
Medication	29
Open Appendectomy	94
Pre-anaesthesia consultation	36
Nutrition	100

Average length of stay (ALOS) was 3.66 days, of which longer than 3 days (recommendation in CP). The average utilization of doctor's visits was 3.66. This indicates that in average length of stay 3.66 days, doctors have visited patient as 3.66 times or can be interpreted that doctor has visited patient each day during treatment period. 100% compliance of laboratory test was just HbSAg (utilization=1.00). Medication according to CP is Antibiotics (Cefotaxime or Ceftriaxone) and Analgesic (Ketorolac Injection or Ketorolac Tablet). All informants said that variances on medication is given as patient's indication. The biggest variances medication was mefenamic acid and cefixime cap, which given as home medication. Another variance on medication was anti-emetic (Ondansetron) [Table 3].

Based on document reviews and interviews, human resources were sufficient and ready to implement acute appendicitis CP. In financial aspect, the management has no funds or expenses specifically budgeted for the preparation, implementation and evaluation of CP. CP's team received a training to prepared CP forms, but it was not specific. It was part of training to prepare for hospital accreditation. Documents that support the implementation of CP were : Clinical Practice Guideline (CPG) of Acute Appendicitis, Drug Formulary which containing the availability of drugs in the hospital (2016), Standard Operating Procedures of Nursing Services. CP' forms was made in accordance to all that documents and another existing hospital policy.

Medicines and medical devices was always available and in a good condition. According to all informants, the



number of bed and operating room was sufficient to give health services to acute appendicitis patients. CP forms was always available in all room.

CP preparation process consists of : identification of stakeholders and leaders, identification of CP leaders and team, deciding on CP to be developed, patient mapping process, preliminary audit and data collection, CP development, pilot phase and implementation, periodic evaluation. According to one of the informants that identification of stakeholders and leaders was done simultaneously by an external researcher team. While identification of CP leader and team was performed by the director of the hospital.

Before deciding on which CP to be made, CP team conducted initial audits and data collection. Most of informants revealed that data collection was based on such as volume, cost and risk. Acute appendicitis was the fifth largest cases. CP have been developed in accordance with existing data. CP is a patient-centered treatment plan. Team must understand what the patient need in

each phase of treatment throughout the hospitalization. Mapping or flow of patient has been considered in the form of CP.

The development of CP has involved the medical team, nurses, pharmacists and support teams. CP preliminary process started by the CP team (medical committee) make draft of CP, then submitted to Surgery Medical Team. There after another meeting of nurses, pharmacists, and lab were held to assess whether the draft was in accordance with their practice guideline. Once everything is in accordance with practical guideline and other hospital's policies, then CP will be launched to all related section.

CP socialization step done by a staff meeting at managerial level, then managers will forward all information about CP to their respective staffs. The obstacle that was felt at that time was the difficulty of medical team to able to attend together. For medical team member who can not attend the meeting, CP team will deliver the information personally.

**Tabel 3: Utilization of CP's compliances**

Pathway	Utilization (average)	Variences*	Utilization (average)
Average Length of stay (ALOS)	3.66 days		
Doctor' visits	3.66		
<b>Lab test:</b>			
Haematology	0.86	Pathology Anatomy	0.63
HbSAg	1.00	Ureum	0.49
Blood clotting time	0.60	Creatinin	0.46
Bleeding time	0.60	PT	0.34
Pregnancy test	0.00	APTT	0.34
Abdomen USG	0.06		
ECG	0.03		
Ro Thorax	0.08		
<b>Medication:</b>		Cefixime Cap	7.81
Cefotaxime Inj	0.72	Mefenamic Acid tab	9.81
Ceftriaxone Inj	1.86	Co-Amoxyclave tab	1.44
Ketorolac Inj	3.19	Metronidazole Inf	1.31
Ketorolac Tab	0.08	OndansentronInj	1.42
Pre-anaesthesia consultation	0.39		
Open Appendectomy	0.94	Laparoscopy	0.06
Nutrition	1.00		

\*the biggest five utilization

The evaluation of CP of Acute appendicitis has been performed once. It should be done at least twice a year. However, this is understandable because of lack of staff to conduct CP implementation evaluation, which are only performed by two members of CP team. The result of evaluation was presented at a meeting attended by doctors, directors and head of nurse.

The main symptom of Appendicitis is presence of right lower abdominal pain accompanied by nausea and vomiting. Most important examination is physical examination, but laboratory tests can support the accuracy of diagnosis<sup>9</sup>. It was not only for diagnostics purposes, but also for surgical procedures. Routine haematology test is one of laboratory tests that must be performed in surgical case. In this study some patients came from another section (general and internal disease) and have done routine haematology test.

In this hospital, CP is designed for all patient without considering payment scheme (Private, Private Insurance, universal coverage-BPJS) and room care classification. BPJS patients was equal with private patients (Table 4).

**Table 4: Payment schemes distribution**

Payment schemes	(%) (n = patients)
BPJS	37% (n = 13)
Private Insurance	26% (n = 9)
Private	37% (n = 13)

Hospital in Indonesia has different ward or room care with different facility and price. CP is designated for all patient. The distribution of patients according to room care shows in table 5.

**Table 5: Room Care Distribution**

Room Care	n = patients	(%)
I	2	6
IA	2	6
IIA	10	28
IIB	3	9
III	11	31
VIP	6	17
VVIP	1	3

Considering to one of informants, CP is addressed to all patients, but this hospital more emphasizing

implementation of CP performed on BPJS patients. While in other patients, clinical treatment plan is more flexible. This may affect level of CP compliances.

ALOS in this study was longer than 3 days (CP recommendation). Length of stay (LOS) influenced by possibilities of comorbidity, post-anesthesia complications, surgical wound infections, complete diagnostics tests.

Rate of pre-anaesthesia consultation was low. Data of this study was taken from patients billing system, any activities that was not counted on billing system, can not be analyzed. Pre-anaesthesia consultation is a mandatory procedure in surgical case. Due to hospital's billing system only counts pre-anesthesia consultation that conducted in ward or room care, while consultation that conducted in the surgery room (just before the surgery start) was not counted. It shows lack of management on financial to count any activities or services to patients.

Variances in medication could caused by imperfect CP. In this study, CP was not considered home medication, symptoms and pain management post-surgery. In post-surgery gastrointestinal tract, nausea and/or dyspepsia is a very common symptom. To reduce these symptoms by given anti-emetic and anti-ulcer. The analysis of variances is vital in CP development to improve best practices met the existing needs<sup>10</sup>. Seeing this, the pathway team needs to evaluate whether home medication (such as mefenamic acid and antibiotics), anti-emetic need to included in clinical pathway.

In implementing CP, human resources (HR) plays an important role. The succeed of implementation was not just depend on quantity and quality, but also on commitment of all team members. Cooperation and acceptance of doctors in implementation of CP is the key. Compliances to CP could reflected commitment of medical team.

Strong commitment of all staff can also generated from the adequacy of socialization and evaluation. At socialization stage, communication between all parties is an important factor for a successful implementation of CP. All staff must understand their role in CP and how far this could affect the output to patient.

Advantage of CP is the possibility of continuous improvement to give a positive effect on service delivery to the patient by performed a periodic evaluation. Form

CP as one of material to conducted evaluation must fulfilled correctly. In this study, found several forms' CP that filled incorrectly (for appendicitis with perforation or comorbidities). This indicates that staffs did not understand very well about how to complete CPs' forms. It was crucial, as data collection and analysis of service variances (different services provided with recommendations written on CPs' forms) are essential for CP development.

In this hospital, staffs must fill two similar form, forms' CP as quality control and another form (which is very similar to forms' CP) as cost control. It could add burden to staffs and caused incorrect on filling form. In the future evaluation, CP team need to make a questionnaire on form fillings' process. This can help the team to understand of any obstacle in ground level, while for staffs also can increase awareness of the importance of CP implementation.

Directors and managers of hospital has an important role in providing direction and example to all staff on the implementation of CP. In addition, hospital leader must translate the vision and mission of CP by communicating to all staff at every meeting. A successful implementation of CP is responsibility of all health care members, from the director to the staff who give health services to patients. Based on interview, from preparation to evaluation of CP, was CP team responsibilities of which only two staffs of medical committee. Inefficiency of CP team can affect the quality of CP dan compliance to CP. And also key to CP success lies in the acceptance and cooperation of clinicians, leadership and support from hospital management, and dedication from case managers, doctors, nurses and other relevant professions<sup>10</sup>.

This study's results show that CP was unsuccessfull for reducing variances. Obviously, the results of our study were limited by small number patients (35 patients). We suggest extending the scope (include cost) and number of patients to give more precisely results for CP development for the next study.

## CONCLUSSIONS

Compliance to CP of Acute Appendicitis was low especially in medication and laboratory tests. CP was unsuccessful as a tool to reduce variances.

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# Determinants of the Pornography Exposure Effects on Junior and Senior High School Adolescence in Sanggau District, West Kalimantan

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## ABSTRACT

Technological advances make it easier to access pornography. The pornography exposure effects are very serious problem among adolescence. It could have negative impact to reproductive health and mental health development. This research was a quantitative research with cross sectional design approach which main purposes to know the determinant of the pornography exposure effect that was conducted on 171 junior on junior and senior high school adolescence in Sanggau District. The results of this research indicated that most respondents had access pornography through photos (images) of 62.0%, including through the internet (78.4%). The pornography exposure effect of respondents was obtained in light level (addiction, escalation, and desensitization stage) was 29.2%, and weight level (act-out stage) was 70.8%. The significant determinants of the pornography exposure effect were the time of access (p value = 0.039, PR = 5.765), gender (p value = 0.0001; PR = 3.600), Duration access (p value = 0.037, PR = 3.730), and media type (p value = 0.001; PR = 2.268). While the status of dating, residence status, marital status of parents were not a significant determinant factor, but showed a positive trend toward the pornography exposure effect. It is suggested to provide information about the danger of pornography on early adolescence as a primary prevention toward accessing pornography. In addition, the collaboration of family and schools are needed to provide assistance in early adolescents to be wise in using the media, and for the adolescents who are in act-out stage need the intensive therapy to behave healthy.

**Keywords:** *Pornography, Exposure Effects, Adolescence, Reproductive Health, School*

## INTRODUCTION

The proliferation of pornography over the last two decades, particularly via the Internet, has influenced youth culture and adolescent development in diverse and unprecedented ways<sup>1</sup>, including in Indonesia. Based on the survey, in 12 major Indonesian cities of adolescent's behavior get as many as 83% of teens once admitted to watch porn videos, 93.7% had sexual intercourse, and 21% or one among five adolescents in Indonesia has had an abortion<sup>2</sup>.

The initiation of adolescent's premarital sexual starting from 82.7% hand touching, 60.7% hugging, 66% kissing, 19.3% touching sensitive areas, 7% oral sex, 4% anal sex, and 14.7% intercourse<sup>3</sup>. This is associated with increasingly accessible pornographic exposure. The literature review showed that the compulsive adolescent's sexual behavior related to pornography<sup>4,5,6,7,8</sup>. The most dominant factors influence the effect of exposure effect was frequency of exposure (often) (Odds Ratio 5,02)<sup>9</sup>.

Consequently, the impact of Internet pornography on adolescents, including compulsive, addictive, and even criminal behavior, is a global trend. They are considered one of the most susceptible audiences to sexually explicit content<sup>1</sup>. Some evidence that exposure to pornography can increase the likelihood of earlier first-time sexual experience, particularly for those adolescents who consumed pornography more frequently<sup>10</sup>.

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There are stages of the effects of exposure that occur on those who exposed to pornography and experience the effects of exposure including addiction, escalation, desensitization and act out. Addiction is an addictive effect. Once a person likes pornographic material then he will have desire to see and regain the material. Escalation is an increase the need for heavier, more sex material explicit, more sensational and more deviant than previously consumed. Desensitization is stage when sex material that was taboo, no moral and demeaning/demeaning dignity humans are gradually now considered to be something the ordinary even the bus becomes insensitive as well against victims of sexual violence. Act out bound when there is an increasing tendency to do sexual behavior of pornography that has been only he sees to be applied to real life<sup>11</sup>.

As well as in Sanggau District, West Kalimantan, pornography exposure is widespread among junior high and high school adolescents. This research aims to know the determinant of the pornography exposure effects on Junior and Senior High School Adolescence in Sanggau District, West Kalimantan.

### METHOD

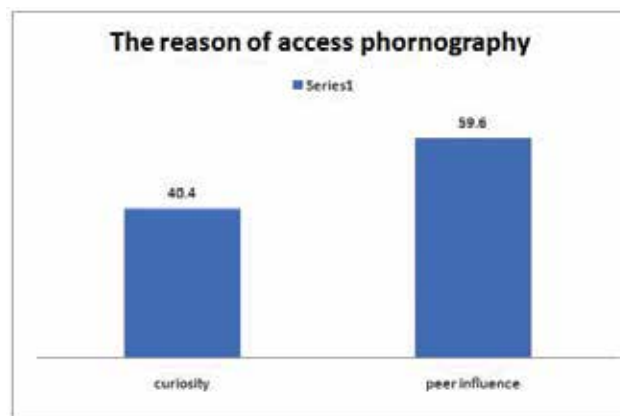
This research was a quantitative research with cross sectional design approach which main purposes to know the determinant of the pornography exposure effect. The population of this study were all of the junior and senior high school students who had been exposed the phornography in Sanggau District, West Kalimantan. This study was conducted on 171 junior and senior high school adolescence in July – December 2017.

Self administered questionnaire was used. To maintain data quality, we did the standardization questionnaires and interviewer training, are conducted informed consents as a sign of approval of respondents, and check the completeness of the contents of the questionnaire. Respondents also must submit the questionnaire in the closed envelope that has been provided. The research assistant presented the study, explaining that the questionnaires were anonymous and self-administered; privacy was guaranteed, and the right not to participate was underlined. Chi-Square test was used to know the significantly determinant variables.

### RESULTS AND DISCUSSIONS

The respondents were highly exposed to pornographic images found in magazines, videos,

television, computers and internet. The Sexually Explicit Materials (SEM) were used to: satisfy curiosity (40.4%), and peer influence (59.6%). These findings was supported by the existing literature that shows that the reason of access phornography was out of curiosity<sup>11,12</sup>. The pointed out of pornography exposure shapes sexual knowledge<sup>13</sup>. Graphic 1 shows the distribution of the reason access phornography.



The univariate analyses could be seen below:

Table 1: Univariate Analyses

Variable	N	Percentage (%)
<b>Media Type</b>		
Printed Mass Media	22	12.9
Electronic	59	34.5
Printed Mass Media And Electronic	90	52.6
<b>Sexual Behavior</b>		
<b>Masturbation</b>		
Yes	81	47.4
No	90	52.6
<b>Kissing</b>		
Yes	108	63.2
No	63	36.8
<b>Necking</b>		
Yes	101	59.1
No	70	40.9
<b>Petting</b>		
Yes	57	33.3
No	114	66.7
<b>Intercourse</b>		
Yes	33	19.3
No	138	80.7

Conted...

<b>Oral sex</b>		
Yes	22	12.9
No	149	87.1
<b>Anal sex</b>		
Yes	17	9.9
No	154	90.1
<b>Level of Addiction</b>		
Addiction	1	0.6
Escalation	3	1,8
Desensitization	46	26.9
Act Out	121	70.8
<b>The reason of phonographic viewing</b>		
Curiosity	69	40.4
Peer influence	102	59.6

Table 1 show the most of respondents access the printed mass media and electronic (52.6%). Adolescent's sexual behavior who had accessed pornography were masturbate (47.4%), kissing (63.2%), Necking (59.1%), petting (33.3%), intercourse (19.3%), oral sex (12.9%), anal sex (9.9%). Futhermore, most of the adolescent's at act out level (70.8%).

**Table 2: Bivariate Analyses**

Variables	Pornography Exposure Effects	
	p value	PR
Time of access	0.039*	5.765
Gender	0.0001*	3.600
Duration Access	0.037*	3.730
Media Type	0.001*	2.268
Status of dating	0.437	-
Residence Status	0.085	-
Parents Marital status	0.532	-

\*Significantly at 0.05

Chi-square analysis was performed to examine the relationships between respondents' characteristics (i.e., gender, parent's marital status, residence status, status of dating, media type, duration access and time to access) and pornography exposure effects. Significant relationships were found for gender, time to access, media type, and duration access (p value < 0.05), but not for status of dating, residence status, and parent's marital status (p value > 0.05). Although there are no

significantly related, but its showed a positive trend. Participants who had dating partner, stayed in family house, and divorce parent's were more likely to get a heavy pornography exposure effects.

There was a strong influence of pornography exposure against teenage sexual behavior. The teenagers who had been exposed the pornography will affect his attitude about the sex picture on him, then will be realized in the form intimacy behavior with her partner<sup>14</sup>. The teenagers who exposed media pornographic tend to have more sexual partners (OR = 1,8; CI = 1,2 - 2,9), have sex partners more than 1 in the period Last 3 months (OR = 1,8; CI = 1,1 - 3,1), and perform anal sex (OR = 2.0; CI = 1,2 - 3,4). In addition, adolescents are exposed to the media pornography has a distant sexual attitude more permissive than unexposed<sup>15</sup>. This research found that most of participants who had exposure pornography, did kissing, petting, necking, intercourse, oral sex, and anal sex. In line with previous research which showed that pornography exposure influences adolescent's sexual behavior<sup>16,17</sup>.

Some studies showed that there was significantly association between gender and pornography exposure<sup>9,18</sup>. Boys were 5 times more likely to currently watch pornography than were girls (Adjusted OR 5.09, CI 2.69-9.63, p < 0.001). They also found male adolescents started earlier and more frequently on their own initiative, found pornography more sexually exciting, and reacted less often with fear or disgust<sup>18</sup>. This research found that male participants is more likely to get a heavy pornography exposure effects. The high prevalence of Internet use among males suggests that males are more inclined to technology than females a trend that needs to be reversed<sup>16</sup>.

There is a significantly association between frequency of pornography exposure to teenage sexual behavior<sup>19,20</sup>, as well as this research. The participants who had accessed pornography more than 3 hours, is more likely tend to get a a heavy pornography exposure effects. They tend to have act out level of premarital sexual behavior. Likewise, approximately 85.11% respondents who had exposed to erotic information with heavy frequency, tend to have risky sexual behavior<sup>21</sup>. The teens who had often frequency of pornography exposure (more from once a week) at risk 5.0 times experienced exposure effects compared with adolescents whose frequency of exposure is rare (approximately one

time a week)<sup>9</sup>. Male's adolescence (95% CI OR = -1.245 - 6.465) were more likely to visit pornographic sites compared with other respondents. Duration of Internet use was also significantly associated with practice of content of sexually explicit sites. This corroborates earlier findings that sexual behaviour can be acquired through exposure to pornography and sexual models on the Internet through imitating and copying of such acts<sup>22,23,24</sup>. Main source of information about the Internet was friends (63.3%), and the frequency of use showed that 29.5% access the Internet every day. Duration of time spent online ranged from 30 minutes to three hours<sup>16</sup>.

Time to access pornography had a significantly relationship with pornography exposure effects. This research found that the participants who accessed pornography in the morning or afternoon is more likely to get a heavy pornography exposure effects than in the night. This is because when accessing pornography during the day, they tend to meet with more people. The pornography viewing by adolescents is harmful to their development, both physically and emotionally. Group and individual therapy, as well as more parental control over what is viewed on the Internet, will be suggested as a way of overcoming or preventing pornography addiction in adolescence<sup>25</sup>.

Electronic media of pornography had a significantly influence to pornography exposure effect. This finding research, respondents who exposed electronic and printed media together, has a chance of 2.27 times to get act out level of addiction. The respondents exposed to pornography through electronic media has a chance of 3.06 times for risky sexual behavior if compared with teenagers who do not exposed to electronic media. Trend teenage sexual behavior is increasing because of the dissemination of information and sexual stimulation through electronic media which is very accessible to teenagers<sup>26</sup>.

## CONCLUSIONS

From the findings of this study, it was shown that the reason of students get exposed to pornography were curiosity (40.4%) and peer influence (59.6). The significant factors contribute to pornography exposure effect are gender, time to access, duration access, and media type. Therefore, the recommendations of this study in education sector management should come up with curriculum and programs that addresses age appropriate sexuality education at all levels. This is

to provide sexuality information from balanced and objective sources where the adolescent and young adults are free to engage and to seek for clarification on sexuality issues, and for parents, educators, policy makers, health professional, and law enforcement be equipped with knowledge on sexuality that can enable them foster a supportive environment that can facilitate health development of youth sexuality, while minimizing the risk potential for negative effects related to pornography.

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**Conflict of Interest:** The authors declare no conflict of interest

**Ethical Clearance:** All procedures performed in studies involving human participants were in accordance with the ethical standards and have been approved by the appropriate institutional research ethics committee.

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# Psychoeducation *Dzikr* Reduces Perceived Stress and Postpartum Depression Syndromes on Primiparous Women

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## ABSTRACT

**Background:** Unstable emotions are common in primiparous women who fail to adapt to changes during perinatal period could not be resolved fundamentally, so research of psychoeducation *dhikr* is crucial to be conducted to reduce perceived stress in an effort to prevent postpartum depression syndromes.

**Purposes:** to prove routine midwifery care plus psychoeducation *dhikr* has more influential on decreasing perceived stress and postpartum depression syndromes among primiparous women.

**Method:** This study was an experimental study. A number of 24 participants as intervention group and a number of 23 participants as control group. All participants completed the Perceived Stress Scale and the Edinburgh Postnatal Depression Scale, in the third trimester of pregnancy, one week before due date of birth, the three days and tenth days after birth. Statistical test using General Linear Model and independent t-test to compare mean difference.

**Results:** At the end of the intervention, the difference of of the PSS score between groups 3.73, CI 95% (-6.14 – (-1.32)) and p value is 0.003. The difference of the EPDS scores between groups 2.34, CI 95% (-4.44 – (-0.24)) and p value is 0.030.

**Conclusions:** The routine midwifery care plus psychoeducation *dhikr* has more decrease perceived stress and postpartum depression syndromes in primiparous women.

**Keywords:** *Dzikr; Perceived Stress; Syndrome Depression*

## INTRODUCTION

Unstable emotions are common in primiparous women who fail to adapt to changes during perinatal period could not be resolved fundamentally. The period of pregnancy and postpartum put the mother in a vulnerable condition of emotional changes that adversely affect the health of mother and baby<sup>1</sup>. The difficulty and failure to adapt the perinatal period are stress transitions and become the initial manifestation of postpartum depression syndrome (PDS)<sup>2-4</sup>. The incidence of PDS in the world is 10% - 15%<sup>5</sup>, and mothers with PDS have an impact on reduced self-care and infant abilities, exclusive breastfeeding failure<sup>6</sup> and impaired first-year growth<sup>7</sup>.

Previous studies of non-pharmaca interventions<sup>8-15</sup> have not been able to prevent PDS completely. The period of pregnancy, childbirth and motherhood are conditions to be closer to the God and make life more meaningful with the use of religious beliefs as a strong coping

mechanism<sup>16</sup>, thereby requiring necessary services to enhance maternal spirituality during pregnancy and postpartum period.

The results of previous studies have shown that the activity of spirituality during pregnancy is a protective factor against postpartum depression symptoms and helps to overcome early stress of motherhood and up to a year later<sup>17</sup>. Taking into account the condition of Indonesian that based on religions, it is the necessary research on routine midwifery care (RMC) plus psychoeducation *dhikr* (PD). The RMC is a care provided by midwives for mothers during pregnancy, childbirth and postpartum in order to prevent any complications. Psychoeducation is relatively short and can be included in routine care. *Dhikr* is a practice of Islam in order to get closer to Him, remembering, mentioning, understanding, expressed in verbal speech, containing expressions of praise, prayer, gratitude, no specific time limit and reading. Psychoeducation *dhikr* has been chosen considering that the implementation is

not restricted to certain conditions, time and readings so that the sustainability of psychoeducation *dhikr* as an effort to achieve and improve mental health of perinatal mother becomes possible.

Some researches on *dhikr* have been done, but no one has been used as an effort to prevent postpartum depression syndrome. The RMC plus PD in primiparous mother in this research is expected to lead the emotional stability and decreases perceived stress so that is expected to prevent postpartum depression syndrome.

This study aims to prove routine midwifery care plus psychoeducation *dhikr* is more influential on decreasing perceived stress and postpartum depression syndrome on primiparous women. As our hypothesis was routine midwifery care plus psychoeducation *dhikr* is more influential on decreasing perceived stress and postpartum depression syndrome on primiparous women compared with routine midwifery care only.

## METHOD

**Study Design:** This research has been an experimental research with randomized pre-test post-test control group design design, the intervention was the RMC plus PD, while the control group got the RMC only.

**Sampling:** Subjects in this research were primigravida mothers at six Community Health Centers, which fulfilled the inclusion criteria with consecutive sampling technique. A total of 47 subjects completed a series of research.

**Measurements:** Perceived stress and syndorm depression have been examined at the third trimester (TM III) of pregnancy, one week before due date of birth, day 3 and 11 after childbirth. The authors used the Perceived Scale Stress (PSS)<sup>18</sup> as indicator of perceived stress that measures the extent to which situations in a person's life are rated as stress, and also to measure stress during the third trimester of pregnancy; comprised 10 items, each item was rated on a 5-point scale ranging from never (0) to almost (4).

Syndrom depression was measured by the EPDS<sup>19</sup>, that have been translated into Indonesian<sup>20</sup>, comprised 10 items, choice answers should have one according to gradation of the mother's feelings felt at the time. Test results on PSS instruments showed that 10 items had value 0.702 and the EPDS had value 0.759 Cronbach Alpha.

**Procedures:** Interventions had been given totally five times; twice in the third trimester of pregnancy, on the 3rd, 7th and 10th postpartum days, for 45-60 minutes of each intervention, using modules in the same sequence of activities, beginning with deep breathing, followed by read the *surrah Al-Fatihah, Al-Falaaq, An-Nass, Al-Ikhlās, Al-Insyirah*, some *Asmaul Husna*, recitation of *tasbih, tahmid, tauhid* and *takbir*, sentences *hauqolah, Sholawat* of the Prophet Muhammad, recitations of *Istighfar* and recitations of *Hamdallah*, end with a deep breath.

The materials used in the study include the Psychoeducation *Dhikr* (PD) module, which has been compiled and reviewed by Islamic religious expert. The PD module was then tested and refined before testing is used. Interventions were conducted by researchers who were assisted by six midwife instructors, each of which was owned by a selected community health center that had been subjected to a perception equation and was given special training three times.

## DATA ANALYSIS

Analysis of the variables of the perceived stress and postpartum depression syndrome in the intervention group and control group used General Linear Model test with post hoc Benferroni and Independent Sample t-Test.

## RESULTS

Descriptive data in the intervention group showed women age in mean 23.96, secondary educational category (79%), not working (66.7%), household income below regional minimum wage (58.3%), all mothers give breast milk and always got family support (83.3%). In the control group obtained the characteristic of women age in mean 22.83, secondary educational category (82/6%), not working (73.9%), household income below regional minimum wage (65.2%), all mothers give milk and always got family support (73.9%). All data were obtained  $p > 0.05$ , so it can be concluded that the subject characteristic data in two groups was homogeneous.

**Perceived stress:** The results showed the mean score of PSS in RMC plus PD group (-0.04) was lower than the RMC group only (-2.17) (Figure 1). Perceived stress was categorized into mild stress level if the PSS score 0 - 13, moderate stress if PSS score 14 - 26 and severe stress if score 27 - 40. The results showed that at end of

intervention in the RMC plus PD group there were 15 (62%) subjects in moderate stress categories and 9 (38%) in mild stress categories, whereas in the RMC group only there were 1 (4%) subjects in the category of heavy stress, 22 (96%) in moderate stress category and none in the mild stress category. It can be concluded that the subjects in the RMC plus PD group were on moderate and mild stress categories, whereas subjects in the RMC group only in moderate and heavy stress categories.

Table 1 showed that there was a difference of PSS score at each measurement time (p value <0,05), so it can be concluded that there was a difference of mean score of PSS between TM III with three days after delivery and with eleven days after delivery between groups, so it is concluded that there is no difference of mean difference of PSS score before and after intervention between the RMC plus PD group compared with the RMC group only.

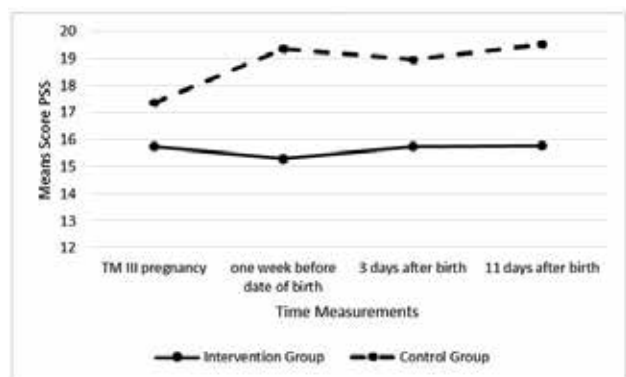


Figure 1: The PSS Score pre and post intervention between groups

**Syndrom Depression:** The results showed that the RMC plus PD group has tended to have decreased EPDS scores, while the RMC group only has a tendency of increased EPDS score (figure 2). Difference ( $\Delta$ ) EPDS score measurements in TM III and eleven days of Post Partum (PP) in the RMC plus PD group (0.96) were greater than the RMC group only (-1.35).

The depression syndrome was measured using an EPDS score of the category: normal if the EPDS score is <10, mild depression if the EPDS score is 10-12, moderate depression if EPDS score of 13-15 and severe depression if the EPDS score >15. The results show that at the end of the intervention in group who got additional PD were in the normal category of 16 (66%), mild depression 4 (17%), moderate depression 4 (17%) and none in severe depression categories, whereas in the RMC group alone the normal category as many as 11 (48%), mild depression 5 (22%), moderate depression 6 (26%) and major depression 1 (4%). It can be concluded the percentage of subjects in moderate and severe depression category in the RMC plus PD group is lower than the percentage of subjects in the RMC group only.

The test results on three EPDS score measurements followed by post hoc analysis obtained p value = 0.216 (table 1), meaning there was no interaction between measurement time and group. In the third posttest measurement, p = 0,030, it can be assumed that there was a difference of mean score of EPDS between the RMC plus PD group with the RMC group only on eleven days PP.

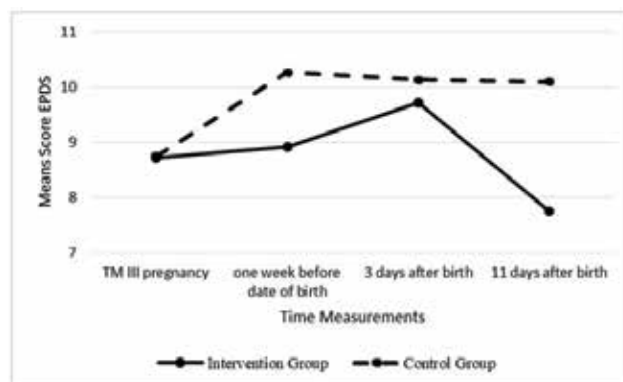


Figure 2: The EPDS Score pre and post intervention between groups

Table 1: Differences of The PSS and the EPDS scores between Intervention and Control Groups

Variable	Measurement time	RMC + PD	RMC	Difference ( $\Delta$ ) (CI95%)	p value
		Mean $\pm$ SD	Mean $\pm$ SD		
Perceived stress	TM III of pregnancy	15,75 $\pm$ 3,84	17,35 $\pm$ 3,07	-	-
	1 week before due date	15,29 $\pm$ 4,06	18,35 $\pm$ 3,58	-4,06 (-6,31 - [-1,81])	0,001*
	3 days after chidbirth	15,75 $\pm$ 2,83	18,96 $\pm$ 2,93	-3,21 (-4,90 - [-1,51])	<0,001*
	11 days after chidbirth	15,79 $\pm$ 4,71	19,52 $\pm$ 3,37	-3,73 (-6,14 - [-1,32])	0,003*
Syndrome depression	TM III of pregnancy	8,71 $\pm$ 4,56	8,74 $\pm$ 3,74	-	-
	1 week before due date	8,92 $\pm$ 4,58	10,26 $\pm$ 3,09	-1,34 (-3,65 - 0,96)	0,246*
	3 days after chidbirth	9,71 $\pm$ 4,94	10,13 $\pm$ 3,48	-0,42 (-2,94 - 2,10)	0,737*
	11 days after chidbirth	7,75 $\pm$ 3,77	10,09 $\pm$ 3,36	-2,34 (-4,44 - [-0,24])	0,030*

\* General Linear Model test, post hoc analysis : perceived stress : p=0,686, Syndrome depression: p=0,216.

## DISCUSSION

The results were proved that the prevalence of perceived stress in the RMC plus PD group was in the category of moderate and mild stress, whereas the RMC group only was in the category of moderate and severe stress. Although both groups did not experience a decrease in mean PSS scores, however, the mean PSS scores in the RMC plus group were smaller than the RMC group alone. This is in accordance with previous research results that interventions based on religious beliefs that are owned can help improve mental health<sup>21,22</sup>.

Provision RMC plus PD is important for women during pregnancy and after childbirth as concerns about physical, emotional and social changes in that period are as stressors for the mother. In this study, the mother described the psychological responses experienced in relation to pregnancy, labor and childbirth; such as sometimes anxious, afraid of mixed happy, early feel tired and have a feeling of not being able to accept the presence of the baby, often waking up at night to breastfeed and feel less attention and lack confidence. This is consistent with the results of previous studies which suggest that maternal concerns include physical changes, appearance, interpersonal relationships, delivery, health and infant care, risks and complications due to medical conditions and distress conditions<sup>23</sup>.

The first changes experienced by primiparous women make them more sensitive to emotional changes and trigger stress<sup>23-25</sup>, but the effects of stressors are moderated by coping resources such as social, spiritual and self-efficacy support<sup>26</sup>. Thus the RMC plus is intended to reduce the effects of stress and change the distress into eustress (stress-controlled), so it does not continue to be psychological distress.

Pregnancy, childbirth and postpartum are physiological processes and as a woman's nature, although the process places the perinatal mother at risk for psychological distress of stress and anxiety. The results of this study adds the fact that the RMC plus PD from the third trimester to postpartum is proven to decrease perceived stress by improving maternal perception by converting distress into eustress.

The PD was interpreted differently that seen from there are still some subjects with high EPDS score after intervention. Due to the rapid adaptation demand in

the perinatal period, so subjects perceive the physical, psychological, and social adaptation processes in that phase as stress. This study showed that subjects in both groups experienced an increase in the mean EPDS score from one week before childbirth to the 1-3 day postpartum, however the RMC plus PD group had lower the mean EPDS score than the RMC group only. In addition, subjects in the RMC plus PD group showed the average EPDS score on the 11<sup>th</sup> day of postpartum decreased compared to the previous measurement time, whereas in the subjects in the RMC group only did not decrease on average.

Decreasing of the mean EPDS scores may be related to improving the ability of mothers to adapt to postpartum changes, however, the results of this study reveal the fact that the decrease in SDP is accelerated or corrected by the addition of PD in RMC. It was proven that the RMC plus PD group showed a lower mean EPDS score compared with the RMC group only, so it can be concluded there is difference of mean score of EPDS from every measurement time. A person with anxiety becomes anxious and agitated, triggers a negative perception of stressor and is associated with an increased risk of postpartum depression syndrome, but the mother who is able to adapt to changes from the prenatal stage to the postpartum stage becomes less risk for postpartum depression<sup>27</sup>.

Some risk factors for postpartum depression syndromes are physical health problems, parental transition, social relationships, personality and psychological history, child health, lack of social support, living stress conditions and the accumulation of problems or difficulties of pregnancy, childbirth and childbirth<sup>28-32</sup>.

In this study, external factors affecting postpartum depression syndromes such as single parent and maternal or infant complications in pregnancy, labor and childbirth have been controlled by determining inclusion, exclusion and drop out criteria and homogeneity in both groups. In addition, the EPDS score as the postpartum depression syndrome indicator of both groups was declared homogeneous before the intervention began. Thus, the decrease of postpartum depression syndromes in the intervention group was more influenced by additional PD, as evidenced by the mean score of EPDS in the RMC plus PD group lower than the mean in the RMC group only (figure 2).

Postpartum depression syndrome may be prevented by PD as part of holistic midwifery care; by optimizing the spiritual element and developing the resources already owned by the subjects. Thus the results of this study prove that RMC plus PD further decreases postpartum depression syndrome compared with routine midwifery care only, with indicators of EPDS score.

The PD begins with a few deep breaths to make the subjects relaxed. This situation is necessary for the subjects to alpha brainwaves that is when it is in relaxation and makes it easy to absorb information and live quickly reading *dzikir* along with and its meaning. Approaches using belief and spirituality are identified as relevant sources during pregnancy and childbirth in dealing with stress, difficult situations and insecurities<sup>33</sup> and are important feelings in creating positive inner feelings along with self-actualization as a woman, as a phase of spiritual transition in the natural life cycle, which plays an important role in the development of the emotional, spiritual and psychological aspects of women<sup>34</sup>.

The limitations of this study were the PSS and EPDS questionnaires have not been tested psychometrically and in this study used Indonesian version.

## CONCLUSION

The routine midwifery care plus psychoeducation *dhikr* on further reduce perceived stress and postpartum depression syndrome compared with the routine midwifery care only.

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**Ethical Clearance:** Ethical permission was obtained from Research Ethics Committee at Faculty of Medicine Diponegoro University. All subjects signed Informed Consent in Bahasa Indonesia.

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# Reduction Sugar of Tuber Paste Flour Additional $\alpha$ -Amylase from *Lc. mesenteroides* EN17-11 and *Fr. fructosus* EN17-20 to Protect People from Diabetes Mellitus

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## ABSTRACT

Local tuber flour as wheat flour alternative can be used to produce food with low sugar which good to protect people from Diabetes Mellitus. To know that flour carbohydrate degradation in order to produce tuber flour with low sugar, reduction sugar of tuber paste flour additional  $\alpha$ -amylase from *Leuconostoc mesenteroides* EN17-11 and *Fructobacillus fructosus* EN17-20 to protect people from Diabetes Mellitus were researched. Flour used were cassava (*Manihot esculenta*), sweet potato (*Ipomoea batatas*) and yam taro (*Colocasia esculenta*) with wheat (*Triticum*) as comparison. The crude  $\alpha$ -amylase was characterized. The detection of  $\alpha$ -amylase activities and reduction sugar contents used 3,5-Dinitrosalicylic Acid (DNS) methods. Data were analyzed with three replicates. The research results showed that optimum activity of *Lc. mesenteroides* EN17-11  $\alpha$ -amylase was reached at 30°C, pH: 4.5; while that *Fr. fructosus* EN17-20. was 60°C, pH 7.0. In 60 minutes incubation time, *Lc. mesenteroides* EN17-11  $\alpha$ -amylase stability was reached at 25-40°C, pH: 4.5-5.0; while that *Fr. fructosus* EN17-20 was at 40-70°C, pH 5.0-7.0. Reduction sugar contents increase of cassava, sweet potato and yam taro paste flour additional *Lc. mesenteroides* EN17-11  $\alpha$ -amylase were sequently 1.27%, 40.35% and 3.90%; while that *Fr. fructosus* EN17-20 were 34.44%, 52.22% and 55.27%; with that wheat additional *Lc. mesenteroides* EN17-11 was 17.40% and *Fr. fructosus* EN17-20 was 44.53%. Based on the result, it is concluded that the treatment may reduce sugar on cassava and yam taro flour. The low sugar flour might be an alternative diet for diabetic persons.

**Keywords:**  $\alpha$ -amylase, reduction sugar, *Lc. mesenteroides* EN17-11, *Fr. fructosus* EN17-20, local tuber paste flour

## INTRODUCTION

Indonesia had high people with Diabetes Mellitus, <sup>[1]</sup> so low sugar food was needed to protect people from that disease. Low sugar food can be made from local tuber flour as wheat flour alternative. Tuber flour in powder can be used as low sugar food, such as tuber paste flour. Tuber paste flour additional  $\alpha$ -amylase

improve quality of that flour and the flour are more to be digested. Tuber local flour, such as cassava (*Manihot esculenta*), sweet potato (*Ipomoea batatas*) and yam taro (*Colocasia esculenta*) were made tuber pasta flour and the other tuber food products, mainly baby food, bread and snack.

Tuber pasre flour with low reduction sugar was good for people to protect from Diabetes Mellitus disease. Some species of lactic acid bacteria (LAB) produced  $\alpha$ -amylase, such as *L. fermentum* and *L. plantarum*. Some species of LAB reported producing  $\alpha$ -amylase were *L. manihotivorans* LMG 18010T, *L. plantarum*, and *L. fermentum*.<sup>[2,3]</sup> The quality increase of flour was conducted by addition of  $\alpha$ -amylase to the flour.<sup>[4,5,6]</sup> Flour additional  $\alpha$ -amylase produced glucose and

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maltose due to catalyzing amylose in the flour by the added  $\alpha$ -amylase. [5,6,7] In human ulcer, flour additional  $\alpha$ -amylase from LAB were more digestible due to hydrolyzing amylose to glucose and maltose. [4,6,7]

The flour type and the concentration of  $\alpha$ -amylase used affected the glucose and maltose contents in the flour additional  $\alpha$ -amylase. [4,5,6] The different amylose concentration between those flour depend on the tuber flour different type. [4,5,6] The different amylose hydrolysis by  $\alpha$ -amylase to glucose and maltose was caused by the  $\alpha$ -amylase different concentration. [4,6,7]

Glucose as one of reduction sugar was generally higher concentration produced than maltose in flour additional  $\alpha$ -amylase. [5,6,7] Beside, LAB species of *Leuconostoc mesenteroides* and *Fructobacillus fructosus* producing  $\alpha$ -amylase which have potency to produce reduction sugar in local tuber flour haven't been known yet. This research focused in reduction sugar of tuber paste flour additional  $\alpha$ -amylase from *Leuconostoc mesenteroides* EN17-11 and *Fructobacillus fructosus* EN17-20 for people with Diabet Mellitus.

## MATERIALS AND METHOD

**Sub-culture *Lc. mesenteroides* EN17-11 and *Fr. fructosus* EN17-20:** *Lc mesenteroides* EN17-11 and *Fr. fructosus* EN17-20 as indigenous lactic acid bacteria (LAB) identified molecularly and found from traditional fermented nira, Enggano Island, collected Research Center for Biology were sub-cultured in *MRS (de Mann Rogosa Sharpe)* media which consist of 0.8% beef extract (Himedia RM002-500G), 1% peptone (Bacto TM211677), 0.4% yeast extract (Bacto TM 212750), 1% glucose (Merck 1.08337.1000), 0.5% natrium acetate (Merck 1.06268.0250), 0.2% triamonium citrate (Sigma A1332-100G), 0.02% magnesium sulphate monohidrate (Merck 1.05886.0500), 0.005% mangan sulphate tetrahidrate (Merck 1.02786.1000), 0.2% dinatrium hydrogen phosphate dihydrate (Merck 1.06580.0500) 0.1%, and tween 80 (Merck 8.22187.0500),. The LAB sub-cultured were then incubated at 37°C (Isuzu incubator Himawari).

**Tube Paste Flour:** Tube paste flour was made from tube flour of cassava (*Manihot esculenta*), sweet potato (*Ipomoea batatas*) and yam taro (*Colocasia esculenta*) with wheat (*Triticum*) as comparison. The tube flour was heated at 70°C up to formed paste flour

**Carbohydrate Degradation of Wheat and Local Tube Paste Flour Additional  $\alpha$ -Amylase:** The 5 gr of each tube flour (cassava, sweet potato, yam taro, and wheat) was soluted in 50 mL aquadest, heated, homogenized by thermomagnetic stirrer (Sibata MGH-320) up to 70°C up to formed paste flour, added 1U/mL each LAB crude amylase, and incubated by rotary shaker (V-Tech VTRS-1) at 37°C for 24 hours.

**$\alpha$ -Amylase Production<sup>[2]</sup>:** Each of LAB suspension was inoculated into 50 mL MRSB media and incubated at 37°C for 24 hours in incubator (Isuzu incubator Himawari). Each of LAB crude  $\alpha$ -amylase was found by growing 2% that bacteria into 25 mL sterilized MRSB media glucose (Merck 1.08337.1000) was changed by 2% soluble starch (Merck 1.01252.0100) with pH medium: 6, incubated for 24 hours at 37°C by incubator (Isuzu incubator Himawari), centrifuged at 9000 rpm for 10 minutes at 4 °C (Kubota 5910). Each crude  $\alpha$ -amylase from those bacteria was then tested its  $\alpha$ -amylase activity.

**$\alpha$ -Amylase Activity<sup>[8,9]</sup>:**  $\alpha$ -Amylase activity was measured by DNS method. The 50  $\mu$ l crude  $\alpha$ -amylase from each of those bacteria was added into 50  $\mu$ l 1% soluble starch (Merck 1.01252.0100) in pH 5.0-8.0, homogenized by vortex (Sibata MGH-320), incubated in waterbath (Memmert) at 35°C-65°C for 10 minutes, added 100  $\mu$ l DNS (Sigma D0550-100G), vortexed, heated at 100°C for 5 minutes, added 800  $\mu$ l aquades, and revortexed. After cooling solution, the absorbance was read at  $\lambda$ 540 by spectrophotometer UV-Vis (Shimadzu UV-1700 Pharmaspec). One unit activity of amylase from each of those bacteria was defined as the amount of enzyme in which its reaction resulted product which equal 1  $\mu$ mol glucose per minute at measured condition.

**Optimizaton of  $\alpha$ -Amylase Activity in Various pH and Temperature<sup>[10]</sup>:** Optimization of  $\alpha$ -amylase from both LAB in various pH detected by pH meter (Horiba pH 1100 Scientific), at 10 minutes" incubation times were conducted at pH: 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, and 7.5. The highest  $\alpha$ -amylase activity at certain pH indicated  $\alpha$ -amylase optimum activity. Optimization of  $\alpha$ -amylase from those bacteria in various temperatures at 10 minutes" incubation times were conducted at 25, 30, 35, 40, 45, 50, 55, 60, 65 and 70°C. The highest  $\alpha$ -amylase activity of each from those bacteria at certain temperature indicated  $\alpha$ -amylase optimum activity.

**$\alpha$ -Amylase Stability in Various pH and Temperature<sup>[11]</sup>:**  $\alpha$ -Amylase stability from both LAB were conducted

by measuring  $\alpha$ -amylase relative activities at pH: 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, and 7.5 with 60 minutes" incubation times. The  $\geq 50\%$   $\alpha$ -amylase relative activity was defined as the  $\alpha$ -amylase stability at certain pH range. Those  $\alpha$ -amylase stabilities were conducted by measuring  $\alpha$ -amylase relative activities at 25, 30, 35, 40, 45, 50, 55, 60, 65 and 70°C. The  $\geq 50\%$   $\alpha$ -amylase relative activity was defined as  $\alpha$ -amylase stability at certain temperature range.

**Reduction Sugar** <sup>[12,13]</sup>: Reduction sugar was measured by DNS method. Reduction sugar (%) was measured by standard curve equation of glucose solution. Carbohydrate degradation in tuber flour of cassava, sweet potato, yam taro and wheat (with and without addition of each LAB crude  $\alpha$ -amylase) was centrifuged at 9000 rpm for 10 minutes at 4°C. Then, 100  $\mu$ l the treated tuber flour was added 100  $\mu$ l DNS, vortexed, heated at 100°C for 5 minutes, added 800  $\mu$ l aquadest, and revortexed. The solution was then leaved at a minute, and absorbance was read at  $\lambda$ 540 by spectrophotometer UV-Vis (Shimadzu UV-1700 Pharmaspec).

Reduction Sugar Concentration (%) = [glucose concentration (mg/mL)/sample weight (mg)]  $\times$  Volume of reaction total (mL)  $\times$  100%(1)

### DATA ANALYSIS

Data were analyzed by three replicates every treatments. Mean data were shown in every Table of the treatments results" Tables.

### RESULTS AND DISCUSSION

The research results show that *Lc. mesenteroides* EN17-11  $\alpha$ -amylase activities in pH: 4.0-7.5 were in the range 0.101-2.325 U/mL with the optimum activity was reached at pH: 4.5 (2.325 U/mL), and in temperature: 25-70°C were 0.166-1.098 U/mL with the optimum activity was at 30°C (1.098 U/mL) (Table 1-2); while that of *Fr. fructosus* EN17-20  $\alpha$ -amylase in pH: 4.0-7.5 were in the range 0.336-0.0929 U/mL with optimum activity was at pH 7.0 (0.0929 U/mL), and in temperature: 25-70°C were 0.0192- 0.2381 (U/mL) with optimum activity was 60°C (0.2381 U/mL) (Table 1-2).

The different optimum  $\alpha$ -amylase activity at a certain pH and temperature between  $\alpha$ -amylase from *Lc. mesenteroides* EN17-11 and *Fr. fructosus* EN17-20

was caused the different species of bacteria producing  $\alpha$ -amylase between those bacteria. It has been reported that the different optimum  $\alpha$ -amylase activity from two lactic acid bacteria may have resulted from the different species of lactic acid bacteria producing  $\alpha$ -amylase. <sup>[2,3,14]</sup>

**Table 1:  $\alpha$ -Amylase Activities of *Lc. mesenteroides* EN 17-11 and *Fr. fructosus* EN 17-20 in Various pH**

pH	$\alpha$ -Amylase Activities (U/mL)*	
	<i>Lc. mesenteroides</i> EN 17-11	<i>Fr. fructosus</i> EN 17-20
4.0	2.000	0.0336
4.5	2.325	0.0405
5.0	2.222	0.0447
5.5	0.555	0.0489
6.0	0.526	0.0558
6.5	0.147	0.0753
7.0	0.118	0.0929
7.5	0.101	0.0750

Note: \*: mean data in three replicates

**Table 2:  $\alpha$ -Amylase Activities of *Lc. mesenteroides* EN 17-11 and *Fr. fructosus* EN 17-20 in Various Temperature**

Temperatures	$\alpha$ -Amylase Activities (U/mL)*	
	<i>Lc. mesenteroides</i> EN 17-11	<i>Fr. fructosus</i> EN 17-20
25	0.819	0.0192
30	1.098	0.0209
40	0.781	0.0226
45	0.685	0.1192
50	0.588	0.1605
55	0.491	0.1925
60	0.395	0.2381
65	0.236	0.1704
70	0.166	0.1026

Note: \*: mean data in three replicates

The *Lc mesenteroides* EN17-11  $\alpha$ -amylase activities in 60 minutes" incubation times in pH: 4.0-7.5 were in range 0.327-2.000 U/mL and the  $\alpha$ -amylase relative activities were in range 16.35-100% (Table 3); while that temperature: 25-70°C were 0.210-1.000 U/mL and relative activities were in 16.35-100% (Table 4). The *Lc mesenteroides* EN17-11  $\alpha$ -amylase stabilities with  $\geq 50\%$   $\alpha$ -amylase relative activities in 60 minutes"

incubation times were reached at pH in range of 4.5-5.0 (1.111-2.000 U/mL) with relative activities were 55.55-100% (Table 3), while that at temperature in 25-40°C (0.500-1.000 U/mL) with relative activities were 50.00-100.00% (Table 4).

The *Fr fructosus* EN17-20  $\alpha$ -amylase activities at pH: 4.0-7.5 in 60 minutes” incubation time were in range 0.0055-0.0133 U/mL with relative activities were 41.35-100% (Tabel 3), while that at temperature: 25-

70°C were 0.0027-0.0151 U/mL with the activities were 17.88-100% (Table 4).

The *Fr fructosus* EN17-20  $\alpha$ -amylase stabilities with relative activity  $\geq$  50% in 60 minutes” incubation times were reached at pH in range of 5.0-7.0 (0.0071-0.0133 U/mL) with relative activities were 53.38-100% (Table 3), while that at temperature in 40-70°C were 0.0087-0.0151U/mL with relative activities were 57.62-100% (Table 4)

**Table 3:  $\alpha$ -Amylase and Relative Activities of *Lc. mesenteroides* EN 17-11 and *Fr. fructosus* EN 17-20 in Various pH in 60 Minutes Incubation**

pH	<i>Lc. mesenteroides</i> EN 17-11		<i>Fr. fructosus</i> EN 17-20	
	$\alpha$ -Amylase activities (U/mL)*	Relative activities (%)*	$\alpha$ -Amylase activities (U/mL)*	Relative activities (%)*
4.0	0.769	38.45	0.0055	41.35
4.5	2.000	100.00	0.0063	47.37
5.0	1.111	55.55	0.0071	53.38
5.5	0.769	38.45	0.0074	55.64
6.0	0.588	29.40	0.0076	57.14
6.5	0.400	20.00	0.0115	86.47
7.0	0.383	19.15	0.0133	100.00
7.5	0.327	16.35	0.0121	90.98

Note: \*: mean data in three replicates

**Table 4:  $\alpha$ -Amylase and Relative Activities of *Lc. mesenteroides* EN 17-11 and *Fr. fructosus* EN 17-20 in Various Temperatures in 60 Minutes Incubation**

Temperatures	<i>Lc. mesenteroides</i> EN 17-11		<i>Fr. fructosus</i> EN 17-20	
	$\alpha$ -Amylase activities (U/mL)*	Relative activities (%)*	$\alpha$ -Amylase activities (U/mL)*	Relative activities (%)*
25	0.714	71.40	0.0027	17.88
30	1.000	100.00	0.0040	26.49
35	0.750	75.00	0.0063	41.72
40	0.500	50.00	0.0087	57.62
45	-	-	0.0111	73.51
50	0.454	45.40	0.0116	76.82
55	0.408	40.80	0.0138	91.39
60	0.362	36.20	0.0151	100.00
65	0.237	23.70	0.0117	77.48
70	0.210	21.00	0.0098	64.90

Note: \*: mean data in three replicates

The different  $\alpha$ -amylase stabilities in certain pH and temperature range between  $\alpha$ -amylase from *Lc mesenteroides* EN17-11 and *Fr. fructosus* EN17-20 were caused the different optimum  $\alpha$ -amylase activity from

two species of those bacteria. It has been reported that the different optimum  $\alpha$ -amylase activity from two lactic acid bacteria species may have resulted from the different species of lactic acid bacteria producing  $\alpha$ -amylase.<sup>[3,7,9]</sup>

The reduction sugar contents“ increases of the cassava, sweet potato, and yam taro paste flour additional *Lc. mesenteroides* EN17-11  $\alpha$ -amylase were sequently 1.27%, 40.35% and 3.90% (Table 5), while that *Fr. fructosus* EN17-20  $\alpha$ -amylase were 34.44%, 52.22% and 55.27%; (Table 6). The reduction sugar content increase of wheat paste flour additional *Lc. mesenteroides* EN17-11 was 17.40% (Table 5), while that *Fr. fructosus* EN17-20  $\alpha$ -amylase was 44.53% (Table 6).

The reduction sugar contents” increases of the tuber paste flour additional *Lc mesenteroides* EN17-11  $\alpha$ -amylase of cassava (1.27%) and yam taro (3.90%) were lower than that wheat paste flour (40.35%) (Table 9), and the reduction sugar contents increases of the cassava paste flour additional *Fr. fructosus* EN17-20  $\alpha$ -amylase (34.44%) were lower than that wheat paste flour (44.53%).

The lower reduction sugar contents” increases from the cassava and yam taro paste flour additional *Lc mesenteroides* EN17-11  $\alpha$ -amylase and that from the cassava additional *Fr. fructosus* EN17-20 than that wheat paste flour were because the carbohydrate degradation of the cassava and yam taro flour (additional *Lc mesenteroides* EN17-11  $\alpha$ -amylase) and that of cassava flour (additional *Fr. fructosus* EN17-20  $\alpha$ -amylase) were lower than that of wheat flour. It has been reported that the tuber flour reduction sugar resulted due to carbohydrate degradation of tuber flour.was affected by lactic acid bacteria amylase activities in that carbohydrate. [4,5,7]

**Table 5: Reduction Sugar Contents of Tuber Pasta Flour With and Without Addition of *Lc. mesenteroides* EN 17-11  $\alpha$ -Amylase**

Paste flour type	Reduction sugar (%)*	Reduction sugar increase (%)
Cassava	0.130	1.27
Control	0.128	
Sweet potato	0.587	40.35
Control	0.350	
Yam Taro	0.437	3.90
Control	0.420	
Wheat	0.440	17.40
Control	0.363	

**Note:** \*: mean data in three replicates

**Table 6: Reduction Sugar Contents of Tuber Pasta Flour With and Without Addition of *Fr. fructosus* EN17-20  $\alpha$ -Amylase**

Paste flour type	Reduction sugar (%)*	Reduction sugar increase (%)
Cassava	0.241	34.44
Control	0.158	
Sweet potato	0.722	52.22
Control	0.345	
Yam Taro	0.237	55.27
Control	0.106	
Wheat	0.256	44.53
Control	0.142	

**Note:** \*: mean data in three replicates

Based on those reduction sugar contents increase in the treated tuber paste flour, it is concluded that cassava and yam taro paste flour additional *Lc. mesenteroides* EN17-11  $\alpha$ -amylase with the 1.27% and 3.90% reduction sugar increase, respectively, and cassava paste flour additional *Fr. fructosus* EN17-20  $\alpha$ -amylase with the 34.44% reduction sugar increase were the tuber paste flour with low reduction sugar.

It is recommended that this low reduction sugar tuber paste flour can be consumed as one of low sugar food, in order to the society were protected from Diabetes Mellitus Diseases.

## CONCLUSION

The research showed the addition of  $\alpha$ -amilase EN17-11 and EN17-20 resulted in sugar reduction. There was difference in optimum condition between both treatment to reduce sugar in term of pH and temperature. However, based on the reduction of sugar content in the treated tuber paste flour, it is suggested that cassava and yam taro with low sugar might be used as an alternative diet for diabetic persons. In the long term goal, the use of low sugar tuber paste flour is also expected to protect people from diabetes mellitus.

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**Ethical Clearance:** This study was conducted according to the guidelines laid down in the Declaration of Helsinki

**Conflict of Interest:** This research wasn't have conflict of interest

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# The Impact of Counseling on the Improvement of Nutritional Knowledge and Physical Activities on Women Prisoners (A Study at Women Penitentiary Institution Class II A Semarang)

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## ABSTRACT

One of the factors that cause health problems is the lack of information about nutrition and physical activity. The study aims to determine the effect of counseling on changes in nutritional knowledge and physical activity on women prisoners in the Women Penitentiary Institution Class II A Semarang. This study used quasi-experimental with one group pre-test and post-test design. Intervention in the form of one-time counseling. Pre test and post test are done in one day. The sampling technique was using simple random sampling. The subjects were 50 women prisoners from common criminal offence cases. Data was analyzed by using Wilcoxon Signed Ranks Test. The results showed that most of the subjects had high school education level (80%). The mean of age, body weight, body height and body fat percentage were  $34.5 \pm 8.4$  years old,  $61.3 \pm 9.0$  kg,  $154.4 \pm 4.5$  cm and  $33.7 \pm 4.7\%$ . Body Mass Index of 44% subjects were type I obesity. Mid Upper Arm Circumference (MUAC) of 94% subjects were normal. The median of knowledge score before counseling were 19 (15-21) and knowledge score after counseling were 20 (15-25). There was an average difference of knowledge of the subjects before and after intervention ( $p = 0.003$ ). There was a correlation between education and knowledge of the subjects ( $p = 0.017$ ). It is recommended for the penitentiary administrators to give education about nutrition and physical activity for the prisoners to increase their knowledge.

**Keywords:** *Counseling, Nutritional Knowledge, Physical Activities Knowledge, Women Prisoner*

## INTRODUCTION

Factors that cause health problems are one's ignorance as well as the lack of information about nutrition and physical activity. Education concerning on nutrition and physical activity are planned efforts to influence others either individuals, groups, or communities so that they do what is expected by educational behavior.<sup>1</sup> the provision of education in the form of certain material

will provide new knowledge for someone. It is expected that if someone has knowledge related to good nutrition and physical activity, it will have an impact on good behavior as well.<sup>2</sup>

One of the educational media related to nutrition and physical activity for inmates is giving counseling by using *powerpoint* medium, this is according to the reason that oral communication can change one's practice to be better. Providing counseling can also speed up the level of one's understanding, so it is easier to change one's attitude since comprehension or knowledge is an important point in changing one's attitude and actions.<sup>3</sup>

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Correctional Facility is a technical service unit that is responsible for looking after and educate the prisoners under the Directorate General of Correctional Institutions of the Ministry of Justice and Human Rights. Prisoners are individuals who commit crime and have

carried out the trial and have been convicted of criminal penalty.<sup>4</sup> Women Penitentiary Institution Class II A is a particular prison for women prisoners located in Mgr. Sugiyopranoto Street Number 59.

Based on the background above, the researchers are interested to find out the impact of education provision with counseling method on changes of nutritional knowledge and physical activity of women prisoners in the Women Penitentiary Institution Class II A Semarang.

**MATERIALS AND METHOD**

The type of this research is *quasi-experimental* with *one group pre-test and post-test design*. The sampling technique used was simple random sampling. Population size was 370 women prisoners. The subjects of the study were 50 women prisoners from the cases of domestic violence, murder, theft, torture, embezzlement, *trafficking*, banking, child protection law, corruption, fraud, taxation, and employment. The independent variables in this research were the provision of nutrition-related education and physical activity with counseling methods, while the dependent variable was the change in prisoner’s knowledge.

Data analysis was conducted univariately to know the characteristics of respondents including education level, age, body weight, body height, Body Mass Index (BMI), Mid Upper Arm Circumference (MUAC) and body fat

percentage. The data normality test used *Kolmogorov-Smirnov* and relationship test used *Wilcoxon Signed Ranks Test*. The instruments used for the research were:

1. **Education level:** Direct interviews using questionnaires.
2. **Anthropometrics**
  - a. Body weight was measured using a digital weight scale with the accuracy of 0.001 kg.
  - b. Body height was measured by *microtoise* with the accuracy of 0.1 cm.
  - c. Mid Upper Arm Circumference (MUAC) was measured using MUAC tape with the accuracy of 0.1 cm.
  - d. Body fat percentage was measured using *Bioelectrical Impedance Analysis* (BIA) with the accuracy of 0.1%.
3. **Knowledge:** Structured questionnaires that have been piloted and viewed through *pre-test* and *post-test*.

**RESULTS**

Frequency distribution of respondents’ characteristics based on education level, age, body weight, body height, Body Mass Index (BMI), Mid Upper Arm Circumference (MUAC) and body fat percentage can be seen in Table 1.

**Table 1: Frequency Distribution of Respondents’ Characteristics**

Variable	%	Mean	SD	Min	Max
Education level					
Elementary	12	-	-	-	-
Junior High School	4	-	-	-	-
High School	80	-	-	-	-
Diploma	4	-	-	-	-
Age (years)	-	34,5	8,4	15	51
Body weight (kg)	-	61,3	9,0	44,8	85,4
Body height (cm)	-	154,4	4,5	145,4	166,1
BMI (kg/m <sup>2</sup> )					
Thin	2	-	-	-	-
Normal	22	25,7	3,6	18,3	36,0
Fat	22				
Type I obesity	44	-	-	-	-
Type II obesity	10	-	-	-	-
MUAC (cm)					
<23,5	6	29,7	3,0	21,5	37,5
≥ 23,5	94				
Body fat (%)	-	33,7	4,7	20,5	46,2

Table 1 shows that 80% of respondents have Senior High School education level. The average age of respondents was  $34.5 \pm 8.4$  years. The average weight of respondents was  $61.3 \pm 9.0$  kg. The average height of respondents was  $154.4 \pm 4.5$  cm. 44% of respondents have Body Mass Index (BMI) classified as obesity type I. The average of Body Mass Index by age was classified as obesity type I by  $25.7 \pm 3.6$  kg/m<sup>2</sup>. 94% of respondents have Mid Upper Arm Circumference (MUAC)  $\geq 23.5$  cm. The average Mid Upper Arm Circumference (MUAC) as normal at  $29.7 \pm 3.0$ . The average of body fat percentage of the respondents classified as obese of  $33.7 \pm 47\%$ .

**Table 2: Distribution of Respondents' Knowledge Responses**

No.	Question	Pre-test		Post-test	
		n	%	n	%
1.	Fried foods/fritters cause disease.	50	100	50	100
2.	Meat, fish, tofu are sources of fiber	6	12	11	22
3.	Eating a variety of foods can fulfill energy needs	36	72	39	78
4.	Cassava, taro, spinach are sources of energy	42	84	42	84
5.	Vegetables, fruits included in fiber sources	41	82	42	84
6.	Healthy food is fast food	38	76	41	82
7.	Vegetables, fruit can boost immunity	49	98	49	98
8.	Colorful vegetables are good for anemia	38	76	45	90
9.	Lack of calcium can cause bone loss so it is needed to drink milk	49	98	50	100
10.	Nutrients the body needs are only carbohydrates and fats	34	68	36	72
11.	The use of salt, salted fish needs to be reduced	45	90	44	88
12.	Drink at least 8 glasses of water per day	49	98	50	100
13.	The benefit of doing exercise is for physical fitness	49	98	50	100
14.	Excessive water consumption can cause dehydration	37	74	44	88
15.	Before doing exercise, you should warm up first	49	98	48	96
16.	Exercise at least 2 hours after eating	31	62	31	62
17.	Nighttime is a good time for sports	41	82	47	94
18.	Vegetables include sources of fat	45	90	46	92
19.	The function of nutrients is for the healthy body	41	82	40	80
20.	Sugar is functioned for bone loss	15	30	23	46
21.	The benefits of exercise are for attitude and movement	25	50	29	58
22.	Exercises should be liked or desirable	42	84	43	86
24.	The lack of vitamin K can cause blood hard to freeze	16	32	25	50
25.	Fruit is a source of vitamins	40	80	39	78

Measurement of knowledge on the questionnaire has a total of 25 questions related to nutrition and physical activity. Each correctly answered question is given a score of 1, while the wrong question is scored 0. Table 2 shows that most of the answers to the questions asked to measure the respondents' knowledge increased after the intervention.

**Table 3: Knowledge Differences of Respondents Before and After The Counseling**

	Median (min-max)		p
	Before	After	
Knowledge	19 (15-21)	20 (15-25)	0,003 <sup>a</sup>

a. Wilcoxon Signed Ranks Test

Table 3 shows that there are differences in knowledge before and after the counseling related to nutrition and physical activity ( $p = 0.003$ ).

**Table 4: Relationship between Education and Knowledge of Respondent**

Education level	Knowledge		Total	p
	Less	Good		
Elementary	7	1	8	0,017 <sup>a</sup>
Secondary	16	26	42	
Total	23	27	50	

a. Fisher Exact Test



Table 4 shows that as many as 7 respondents with elementary education have less knowledge and 1 respondent has good knowledge. A total of 16 respondents with secondary education have less knowledge and 26 respondents have good knowledge. There is a relationship between education and knowledge ( $p = 0,017$ ).

## DISCUSSIONS

### A. Knowledge of Respondents Before and After

**Intervention:** Provision of intervention in this research is an education in the form of counseling by using the *powerpoint* medium. Materials delivered are related to nutrition and physical activity.

There is a difference of knowledge before and after the provision of intervention, this means that there is an influence of education in the form of counseling at the level of respondent knowledge related to nutrition and physical activity. The difference in knowledge can be known from the median change before the counseling amounted to 19 and increased after education provision of 20.

Education provision in the form of counseling by using *powerpoint* medium is considered quite effective in increasing the knowledge of respondents. This research is in line with the research on "Knowledge increment assessed for three methodologies of teaching physiology" and it states that there is an increase in the mean value of both the knowledge based on the *pre-test* and *post-test* results. Provision of education in the form of audiovisual media resulted in a 26% increase in knowledge compared to didactic methods of 7%.<sup>5</sup>

Knowledge is the result of human sensing or the result of knowing by a person to the object through his or her senses (eyes, ears, nose and so on), but most of it is received through the sense of sight and hearing. The senses that transmit knowledge to the brain are the eyes (approximately 75% - 87%).<sup>6</sup>

The improvement of knowledge scores may cause of various factors such as selection of media. Counseling starts with the interaction with the person to be counseled. Before the actual interaction, it is helpful to determine the information needed and then the formulate question. During the interaction, it is essential to introduce and openly talk in order to get

the confidence of the person to be counseled. Counseling is more effective if information is imparted in a very friendly way avoiding superiority and authority.<sup>7</sup>

The selection to use *powerpoint* medium in counseling is quite effective because it is received through the sense of sight (eyes) of the *powerpoint slides* that are displayed and received through the sense of hearing (ears) of the delivered material. In addition, the question and answer session at the end of the counseling can be used as a recall of knowledge that has been obtained. The level of knowledge can be changed by a combination of various methods. Another factor that may affect knowledge is interest that can be improved through the educational method used. Counseling using *powerpoint* medium can provide interest from the slide shown in the form of images, video, writing, and interesting designs.<sup>8</sup>

### B. Relationship between Education and Knowledge:

There is a relationship between education and knowledge ( $p=0,017$ ). This research is in line with the research on "Demographic Variation in Nutrition Knowledge in England".<sup>9</sup>

The level of formal education of the respondent can affect the person's ability to receive information. The higher level of a person's education, the easier one can absorb new information so that knowledge insight will be wider.<sup>10</sup> Therefore, a person with a higher level of education will have better knowledge than someone with a low level of education.

Nutrition education is a significant factor in improving nutrition knowledge, attitudes and practices. It is important to note however, that though nutrition education is an important entry point to teaching nutrition, it is not the only source of nutrition knowledge. Nutrition education is the process by which people gain knowledge, attitudes and skills necessary for developing appropriate dietary habit.<sup>11</sup>

## CONCLUSIONS AND SUGGESTIONS

There is a difference between respondents' knowledge before and after the intervention. There is a relationship between education and knowledge of respondents.

It is expected that penitentiary administrators to provide education about nutrition and physical activity for the prisoners to increase their knowledge.

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# Challenges of Universal Access: Health Promotion Strategy on Pillar of Open Defecation Free in Tirto Village, Pekalongan, Central Java, Indonesia

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## ABSTRACT

The monitoring data on Community-Based Total Sanitation (CBTS) Indonesia in 2017 shows that 14,322,858 heads of households are still doing the Open Defecation (OD) and in Tirto Village itself, it is registered that there are 49 heads of households who are still doing the Open Defecation. The research was conducted in the coastal areas, Tirto Village, Pekalongan, Central Java, Indonesia from January to March 2016. Qualitative research with case study design aims to explore how advocacy, environmental formation, community empowerment and partnership on pillar of Open Defecation Free (ODF). The study used in-depth interview techniques to the key informants consisting of a manager of public health agency, a staff of public welfare, a public figure, a member of community empowerment institution and a healthcare worker. Triangulation of resources were carried out to sanitation officer and residents. The results of the research are: there is no strict regulation from the village because the regulation is still limited to planning documents, there is already coordination with related sectors, but the scope is not yet broad enough, motivations have not succeeded in changing the behavior of the community and no specific finding about the partnership. Thus, a suitable strategy for achieving universal access is conducting a health promotion strategy reinforced by sustainable partnership and insightful innovation through strict regulation, expanding coordination with relevant sectors, raising public awareness through potentials, and strengthening partnership through network expansion to integration.

**Keywords:** *Open Defecation, Health Promotion, Universal Access.*

## INTRODUCTION

Eligible sanitation is the right of every human being living on earth, they contribute to the behavior of Open Defecation (OD) range the one billionth. In Indonesia, the OD is usually done in the river, and it is perceived as a culture. This issue is regulated in the Community-Based Total Sanitation (CBTS) regulation through the Regulation of the Minister of Health, Number 3, Year 2014. Open Defecation Free (ODF) is the first pillar of CBTS. The regulation is in line with the sixth goal of

Sustainable Development Goals (SDGs) on water and sanitation aspects in order to achieve universal access.

The monitoring data on CBTS in Indonesia in 2017 showed that 14,322,858 heads of households in Indonesia are still doing the OD. Indonesia Health Profile in 2016 showed that the total achievement of a village in Central Java that organized CBTS activities was 60.88%. In 2016, Pekalongan City Health Office stated that out of 47 villages in Pekalongan, there were only 10 urban villages with ODF status, excluding Tirto village. Tirto village is located in Pekalongan, Central Java, Indonesia. The monitoring data of CBTS Indonesia, in 2017 showed that there were 49 heads of households who were still doing the OD in Tirto Village. The phenomenon of OD was dominated by those living by the river. They had latrines, but disposed human waste into the river or without a septic tank. Even the OD done directly in the river and in the garden were still encountered.

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The findings of previous researchers on the behavior of OD became the basis of researchers to continue and prove the condition.<sup>1</sup> Research on the financial program of the Community-Led Total Sanitation (CLTS) in Ghana and Ethiopia shows the cost of each household in CLTS activities reaches \$ 30.34 - \$ 81.56 (Ghana) and \$ 14.15 - \$ 19.2 (Ethiopia). The highest cost allocation refers to training activities. This finding can be useful for considering a policy. Thus, some studies both on the effectiveness and cost efficiency are needed to support the sustainability of the sanitation program.<sup>2</sup> The costly expense causes the behavior of OD problems are still found in areas with people in the middle and low economic status, like in some areas in Indonesia.<sup>3</sup> The OD problems are found in poor households, so special attention is critical.<sup>4</sup> Globally, governments in some regions allocate funds for public services in sanitation are very limited.<sup>5</sup> A total of 31 municipalities located in sub-Saharan Africa is allocating more costs for improved water purification than to reduce the behavior of OD. Whereas the water consumed has been contaminated by bacteria.<sup>6</sup> The behavior of OD exacerbates water and sanitation conditions through the fecal-oral cycle.<sup>7</sup> Some areas show the amount of children who use the toilet is still very small because they feel more comfortable with the OD.<sup>8</sup> The failure of CLTS to change, the behavior of OD in Mawuko has resulted in increased prevalence of hookworm infection cases such as *Ascaris lumbricoides*.<sup>9</sup> Research in the southeastern part of Ethiopia describes personal hygiene as one of the factors that strengthens diarrheal disease, so the prevalence of diarrhea in children under five years old is increasing.<sup>10</sup> *Escherichia coli* contaminates the foods and beverages consumed by children under five years old.<sup>11</sup> Environment-based diseases such as diarrhea are very familiar in sub-Saharan Africa. The prevalence of diarrheal disease increases with the increasing of OD habit.<sup>12</sup> Transmission of infectious diseases such as diarrhea can be exacerbated by population density.<sup>13</sup>

Social manipulation during the mobilization of CLTS is essential to raise awareness within a community.<sup>14</sup> By presenting influential actors such as youths, teachers or students can increase high participation in society. The community empowerment strategy for youth is the utilization of local potentials for sustainability of sanitation in a certain area.<sup>15</sup> This study uses the concept of health promotion strategy to explore the condition of ODF in Tirto Village. The implementation of the ODF pillar

should strive for the strategic action of health promotion consisting of advocacy, environmental formation, and community empowerment which are strengthened by partnerships. Researchers have outlined the action into nine research focuses on regulation, commitment, funding, public disposition, facilities, coordination, socialization, training, motivations, and partnerships. Thus, the purpose of the research is to explore this strategic action in Tirto village. These findings are expected to develop the implementation into more robust result in a form of a health promotion strategy reinforced in a sustainable and innovative-minded partnerships to face the challenges of universal access.

## METHOD

Location of research is the Tirto Village, Pekalongan, Central Java, and is conducted from January to March 2016. Qualitative research was used by applying the draft case studies. Research informants were seven people in total; key informants consist of a manager of public health agency, a staff of public welfare, a public figure, a member of community empowerment institution and a healthcare worker, as well as the triangulation of sources by a sanitation officer and a citizen. Triangulation of sources was done to keep the quality of the data provided by the key informants during the first stage remain valid. The collection of qualitative data is done through in-depth interviews to the informants. The interview covered the open-questions, the question which researchers composed led to some descriptive answers based on examples or evidences. The main questions included advocacy, environmental formation, community empowerment and partnership. The main questions in term of advocacy included regulation, commitment, funding, public disposition and facilities. The main questions in term of environmental formation included coordination and socialization. While the question about community empowerment included training and motivation as well as the question of partnership. Before doing the interviews with the prospective informants, the research team gave them a letter of willingness in a form of an informed consent. During the interview process, we used guidelines for interviews, recording and documentation tools as well as booknotes for field work. The interviews were conducted more than once, each interview took around 60-90 minutes.

Research analysis was based on content analysis. Researchers transcribed the information from the audio

recordings into a written form based on the order of interview process. Transcribed interviews were also distinguished between key informants and triangulation sources for the sake of quality control of the data. It was conducted by comparing the two answers. After comprehending the audio recording of the interviews, researchers interpreted the meaning of the answer by applying pattern matching format in form of a table containing columns to determine the pattern of answers given by the informant. Those patterns became references in research results, then the patterns were developed and supported by theories, results of the previous researches.

### RESULTS AND DISCUSSIONS

**Public Profile of Research Location:** Pekalongan is located in the coastal areas of the northern island of Java. Tirto is one of the villages located in the Pekalongan, Central Java, with an area around 141.7 kilometers. In addition, Tirto village consists of 8 hamlets and 40 neighborhoods. Generally, people of Tirto work as employees, entrepreneurs, farmers, merchants, and civil servants. The Tirto village has a large river running from south to north. The majority of people in Tirto village defecate in toilet, however, a certain community group, either children, teenagers, adults or elderly people still defecate in the river.

**Advocacy:** The advocacy actions in Tirto Village showed varying findings regarding the condition of ODF. It includes regulation, commitment, funding, public disposition and facilities. First, there is no strict regulation yet, the Government of Tirto Village only made regulation to support the pillar of ODF in a form of planning documents.<sup>16</sup> Second, the Government of Tirto Village committed to ODF, they showed enthusiasm by establishing coordination with the team who took charge of drinking water and sanitation providers in Tirto Village.<sup>17</sup> Third, CLTS in a form of motivation was funded through Health Operational Assistance (HOA). Other funds come from drinking water and sanitation providers, but they allocated more funds for clean water improvement than to reduce the behavior of OD.<sup>18</sup> Fourth, public dispositions related to motivation to change the behavior of ODF were not fully accepted by the public.<sup>19</sup> They admitted that they have some commitment to the ODF, but practically, there were some people in a certain society are still behaving in an unhealthy way or doing the OD because for them, it feels more comfortable. In fact, when the research took place, we found physical evidence of an unrealistic chamber on a river with a wooden pedestal and a cover made of a used old sack. People often call the chamber with the term “helicopter”.

**Table 1: Characteristics of The Informant**

No.	Jenis Informan Type of Informants	Jenis Kelamin Gender	Kode Informan Informants' Code
1.	Informan Utama 1 Key Informant 1	Laki-laki Man	IU01 IU01
2.	Informan Utama 2 Key Informant 2	Perempuan Woman	IU02 IU02
3.	Informan Utama 3 Key Informant 3	Laki-laki Man	IU03 IU03
4.	Informan Utama 4 Key Informant 4	Laki-laki Man	IU04 IU04
5.	Informan Utama 5 Key Informant 5	Perempuan Woman	IU05 IU05
6.	Informan Triangulasi Triangulation Informant 1	Laki-laki Man	IT01 IT01
7.	Informan Triangulasi 2 Triangulation Informant 2	Perempuan Woman	IT02 IT02

“..... Currently the CBTS achievement in Tirto Village is already good because there are almost no helicopter anymore above the river or the percentage is around 80-90%. Only a few who need assistance, especially newcomers and rented houses near the river.... (IU02, woman & IT02, woman)”

Fifth, the programs of clean water supply and community sanitation produced a physical form that could give some benefit for the people of Tirto village. Evidence of finding was in a form of public toilet facilities similar to box chambers for the community, but the hygiene was not maintained.<sup>20</sup> The pillar of ODF focused in the aspect of behavioral change of people to use healthy toilets equipped with safe disposal of septic tanks.<sup>21</sup> This means that the availability of public toilet did not guarantee people to change their behavior, they still preferred doing the OD in the river.

“.... A big problem for us is about the citizen’s perceptions. They feel better when defecating in the river. (IU03, male)”

**Environmental Formation:** Environmental formation in the Tirto Village showed varying findings related to the condition of ODF. This formation included coordination and socialization. To actualize its mission in order to reach the ODF, first, the Government of Tirto village had multi-sectoral coordination.<sup>22</sup> Coordination was addressed to community health center, community actor, health cadres, water and sanitation teams and other activists.

“... Coordination that is built is a cross-program and a cross-sector. For the cross-program, we work with doctors and health promotion officers. While for the cross-sector, we usually coordinate with village health forum.... (IT01, male)”

Second, the socialization of CLTS was in a form of motivation to the people in order to reach the area of stop OD. This socialization was informed at the village meeting or forum. Socialization with other innovations had never been done.

**Community Empowerment:** The actualization of community empowerment in Tirto village showed various findings related to the condition of ODF. Community empowerment included training and motivation. CLTS training attempts were directed to the teams of water supply and sanitation. Meanwhile, there is no CLTS training for public figure. CLTS training interviewee is a facilitator of CBTS from Central Health Department and Health Department of Pekalongan.

“... At hamlet level, there have never been any CLTS training, but the Non Governmental Organization (NGO) and the Community Self-Help Agency in Tirto village often received the training. Both the NGO and the Community Self-Help Agency are teams of water supply and sanitation at Tirto. (IU03, male & IT01, male)”

Motivation is part of CLTS. CLTS is a sanitation program, motivation attempt aims to change the behavior of OD in the community to use healthy toilets by bringing out a sense of disgust to the people.<sup>23</sup> This sense of disgust would be seen when simulated water treated with feces were demonstrated in front of them. This kind of manipulation is used to provide a stimulus for public perception to stop the OD.<sup>24</sup> This activity is carried out by sanitation officers accompanied by healthcare workers.

“... The obstacles of the motivation attempt occurred when it was confronted with the laggard group. This group is a group that rejects or refuses to accept the ODF behavior. While the chance we have is that some people accept the defecation behavior in the toilet. The key is being patient, doing the process gradually and understanding the society. (IU02, female)”

For the post-motivation, the community was monitored for the progress of their attitude and behavior. The motivation attempt was not a powerful weapon to change people's behavior because the effects vary. Some responded well or provided feedback by changing their old habit and starting to use the healthy toilets. However, some people were still remain doing the OD in the river, they did not respond well.<sup>23</sup> Thus, such a condition is a difficult challenge to lead people to stop the OD.<sup>8,25</sup>

“... Some people live on the edge of the river, they have latrines but still use the river, even their garden. (IU05, female)”

**Partnership:** Tirto Village has been implementing Advocacy, Community Development and Community Empowerment to reach the pillar of ODF. However, there are no specific findings related to the partnership made by Tirto Village in actualizing the pillar of ODF.

“... The village strongly supports the ODF program, but since Tirto Village was in a developing condition, the village can only provide limited and general support and has not yet established a partnership. Hopefully in 2019 we will be able to achieve success (IU01, male)”

**Health Promotion Strategy towards Universal Access:** ODF is one of the major project of the sanitation in Indonesia. Total heads of households that were still doing the OD were as much as 14,322,858. This number showed that the achievement made in 2017 was still far from target to actualize 100% ODF target in the upcoming 2019.<sup>26</sup> So, research conducted in Tirto Village was expected to explore obstacles that occurred. The regulation was crucial to support the health program because it can amplify the success in achieving the objectives. Research findings in Tirto Village pointed out that there was already regulation of ODF in a form of written planning-document. Unfortunately, this regulation was still not implemented. A regulation had to lead to a real action. The strict regulations was very

necessary to reach the ODF target.<sup>27</sup> The consequences which were set for those who violates the strict rules were by giving the subjects some penalties or fines and social sanctions. The implementation of the regulation is an attempt of Government if Tirto village in fulfilling people's rights to get healthy environment.<sup>28</sup>

The strict regulation could bring up commitment from various circle of community. The high enthusiasm to achieve ODF together would appear by itself. The principle of the mutual cooperation in achieving a goal can build a network with various sectors.<sup>29</sup> The society would move to use the potential that had been already had. It includes an attempt to optimize public toilet facilities by taking care of it and keeping it clean. When the society felt that a healthy toilet was a primary need, then gradually they would be able to provide the facilities independently. This is due to the perception that poor sanitation is a necessity. The public perception about sanitation or decent toilets which was increasingly stronger can reduce the rejection towards the pillar of ODF. As for the health operational support, drinking water and sanitation providers were just initial facilitation activities before the society could manage it independently.

Subsequent finding showed that the CBTS facilitator provided training to the team of the of drinking water and sanitation providers. A facilitator from the main office only trained the CLTS only once. The received effect was not that satisfying. The one-time training could not accommodate the needs of the teams to carry out the CLTS in real life. Even training CLTS did not involve any public figures who were the role model for the community because they had their own charisma. An intensive and ongoing accompaniment of facilitators was urgently needed in the area of OD. Ideally, one village haf one facilitator. So, the facilitator could accompany the team and the public figure whenever the CLTS was held.<sup>30</sup> The pillar of ODF did not provide physical help, but the main goal was to make a society able to stop their OD habit through CLTS.

The execution of CLTS which is accompanied by facilitator can be more optimal because the facilitators can understand the strategy of success much better. The facilitator will influence people with questions about the profile of sanitation in the community, unwittingly, their answers lead to the long-term effect of the OD habit so

that people feel the need to get a decent sanitation. The key is that people must be aware of the need of healthy toilets and sanitation.<sup>29</sup> Thus, the feedback from the community will reach the expectations. Gradually they will behave 100% ODF. No less important, the society should be empowered to understand the potential that they have. Potential can be directed to multiple choice. First, by empowering village leader to allocate the village's funds to meet the society's need in a form of healthy toilets. Second, by empowering the society to start doing the toilet savings and sanitation credit action.<sup>31</sup> The information on toilet savings and sanitary credit can be disseminated through a forum that is already formed.<sup>32</sup> When in a certain village or in a neighbourhood there are sanitation entrepreneurs, then this potential can be empowered. Sanitation entrepreneurs can make a simple, healthy, and affordable model of toilets.<sup>33</sup> So that the needs of sanitation in Tirto village can be fulfilled.

The river in Tirto village can serve as alternative to finish up the OD issues. Government of Tirto village along the local people must be able to innovate. Alternatives refer to cultural and tourism aspects such as creating a Javanese cultural stage action or cultural art performances near the river. This can support the regulation of OD prohibition, thus preventing the community from behaving the OD.<sup>34</sup> Gradually, the village leader should be bold in conditioning the river to become clean again. Clean river and aesthetic value of nature is a regional asset. Thus, the public will try to keep the asset. These aspects are the sustainability and innovation of health promotion strategies that need to be applied.

#### **The Power of Partnerships towards Universal Access:**

Implementation of a health promotion strategy needs to be strengthened by partnerships. The partnerships that are built include various components to achieve the objectives of ODF, in which to stop OD is the initial target towards universal access. The role of leaders greatly influences the sustainability of a program as well as the support of funds contributes to the partnership process.<sup>35</sup> Thus, leaders from Tirto village can determine in advance who will partner with them. The first partnership step is to expand the network. Networking is informal and limited to exchange information or experience. Government of Tirto village can build network with those who have reached ODF, for example the neighbourhood village. In this context, the one to be achieved is the information from those which may be adopted in Tirto village.<sup>36</sup>

Necessarily, the village can create cooperation. In Pekalongan, there are areas that have reached the ODF and some other have not yet. The government of the village can cooperate with the other villages that have not stopped the OD. The cooperation is created based on common goals. The alternative of this cooperation can be continued at the next level, which is to coordinate. The coordination aims to ask for support from top-level governments. It can also be made to relevant sectors that can be expected to contribute. The coordination in question is with sub-district, prominent religious figures, sub-district police and military regimental command at the sub-district level. To coordinate with the sector it is necessary the originator. In this context is the leader of Tirto village. The last is the integration among sectors embodied in real action to the community.<sup>10</sup> This context can be called action by involving the above sectors to reach the pillar of ODF. Concrete forms of implementation or output of partnerships include ODF campaigns by religious leaders, CLTS together with police and military regiment command and firm policy on ODF from sub-district leaders. Even subdistrict leaders have the authority to make regulations in the form of fines or penalties.<sup>37</sup> To reach the goal of ODF, there are times when people need a little coercive element through the regulation. Partnerships actually look for relationships that can facilitate a goal. Thus, more and more parties that support will feel undemanding and easy to achieve. However, opportunities like this have not been adopted. Therefore, a sustainable, innovative health promotion strategy reinforced by partnerships can result in strategies to address the universal access challenge of sanitation.<sup>38</sup> Universal access is a target of sustainable development to be achieved by 2030.

## CONCLUSIONS

The conclusion of this research is that generally, universal access becomes a public challenge. To achieve universal access, ODF must be achieved by the smallest unit of a country, that is village. Thus, a country can fulfill the right of every citizen to obtain a healthy environment. A suitable strategy is a health promotion strategy reinforced by partnerships in a sustainable and innovative way. The strategies can be done through: advocacy, that is by making strict regulation with consequences; environmental formation, it can be done through expanding coordination with related sectors; community empowerment, it can be done by raising awareness through the potential of

the society; the last is to strengthen partnerships through networking, collaboration, coordination and integration. Thus, the sustainability and innovation of health promotion strategies on the pillar of OD are opportunities that need to be applied to address the challenges of universal access.

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# Understanding HIV/AIDS Perception Using Health Belief Model of Female Sex Workers with HIV/AIDS

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## ABSTRACT

**Background:** The way of transmitting HIV/AIDS through sexual behavior with multiple partners. Female sex workers (FSWs) risky to transmitted HIV/AIDS and stigmatized by the community. There are still some sex worker women who do not use condoms to prevent transmission. The study aims to explore the perspectives of FSWs to HIV/AIDS about the disease.

**Method:** A qualitative study using in-depth interviews was conducted to seven female sex workers (FSWs) who are transmitted HIV/AIDS from April to May 2018. The in-depth interview guidelines explored about the FSWs perceptions on HIV/AIDS, the experiences of getting stigma and discrimination in the health services and their prevention behavior to their partners using Health Belief Model.

**Results:** HIV/AIDS is not a dangerous disease. The assumption that people living with HIV/AIDS can still work made a thought that the disease is not dangerous. Giving of health education has been done regularly to women sex workers, but there are still women sex workers who do not use condoms at work. Stigma and discrimination in health services are still being felt. The female sex workers perceptions and stigmatization of them are essential. Strengthening the role of peer educator in educating FSWs, educating the health workers, and also the local regulation or *Peraturan Daerah* about HIV/AIDS prevention should be implemented.

**Conclusion:** A comprehensive strategy to increase knowledge, understanding, and life skill should be considered in this setting. Health education is required to increase FSWs and health workers knowledge about HIV/AIDS. Public health strategies need to be strengthened in localization where health access is highly utilized.

**Keywords:** *Female Sex Workers, HIV/AIDS, Health Belief Model*

## INTRODUCTION

HIV/AIDS is one a very global health problem, this is because Acquired Immune Deficiency Syndrome (AIDS) is a threat of life and there is no cure for this yet<sup>1</sup> World Health Organizations estimates 0.8% communities around the world aged 15-49 years living with HIV. In Indonesia estimated that there were 142,950 people infected HIV and 55,623 people in the

stage AIDS. Cumulative percentage of AIDS highest in the 20-29 age group year is 32.9%<sup>1</sup>. The latest data from the AIDS Commission (KPA) of Yogyakarta province shows that number of HIV is 3334 people and AIDS as many as 1314 people.

Percentage of HIV/AIDS cases based on how the transmission is divided become heterosexual (78%), IDUs (9.3%), male sex with men (4.3%), and from HIV positive mothers to his son (2.6%).<sup>2</sup>Female sex workers are one of the most vulnerable groups to HIV infection in the world today. HIV epidemics are rapidly attacking female sex workers populations with prevalence above 65% in some countries among others: India, Indonesia, Cambodia and the Russian Federation. in Semarang the level of awareness of female sex workers in using condoms is only 1%, whereas the use of condoms is

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one of the efforts to prevent transmission of HIV/AIDS infection. In addition, from 0.8% of female sex workers the highest percentage of HIV infections at the age of 18-21 years is 31.3% (n = 258).<sup>3</sup>

Female sex workers sometimes are aware of medical checkup into a health worker, but there are also waiting for it to come health workers who survey to localization to see female sex workers health status, some even still believe that STIs can be prevented only by take initial antibiotics with buy it at the pharmacy.<sup>4</sup> Some commercial sex workers find it difficult when seeking health services when they are infected with STIs or HIV/AIDS because they do not get permission from pimps. In addition, there are still many myths that develop among commercial sex workers that cause commercial sex workers to do their own treatment of illness.<sup>5</sup>

## Problem Statement

**1.1 Purpose and Objective of the Study:** The purpose of the study was to identify the perspective of female sex workers with HIV positive about the severe, vulnerability, the benefits to get HIV/AIDS treatment, and the barriers to get HIV/AIDS treatment. The objective of the study was to explore and describe the perspective of female sex workers with HIV/AIDS in order to understand their health seeking behavior to get HIV/AIDS treatment.

## 1.2 Definition of key concepts

**1.2.1 Perceived Severity:** In this context the term perceived severity defining the expectation of female sex workers about the severe of HIV/AIDS.

**1.2.2 Perceived Vulnerability:** In this context the term perceived vulnerability defining how the female sex workers with HIV/AIDS expecting the vulnerability of HIV/AIDS to them.

**1.2.3 Perceived Benefits:** In this context the term perceived benefits refers to the benefits that female sex workers with HIV/AIDS get from HIV/AIDS treatment in term of getting ARV in health services.

**1.2.4 Perceived Barriers:** The term perceived barriers refers to the barriers who are faced by female sex workers to get health facilities including the experience of getting stigma and discrimination in health services.

## RESEARCH DESIGN AND METHOD

**Research Design:** This study is a qualitative, descriptive, and explorative in order to gain depth information about the perception of female sex workers who are HIV positive to the HIV its self. In order to complete the number of informants, researcher collaborated with the NGO who are concern on the empowerment of the people who are living with HIV.

**Sampling methods and study sites:** The population of the study all the female sex workers who are infected by HIV/AIDS. The informants were selected by purposive sampling method. The inclusion criteria were applied : female sex workers (18 years and older), HIV positive, working as female sex worker minimum a year, agree to be interviewed.<sup>6</sup>

## DATA COLLECTION

The data collected from April to May 2018 by indepth interviews and used guideline questionnaire which assisted the researcher to gain the depth information of the female sex workers with HIV/AIDS perception about HIV/AIDS itself. All the interviews were conducted different settings such as cafe and primary health care where the informants got the ARV depends on the appointment with the informants.

The data collection was finished in a week. The researcher interviewed one informant each day. Interviews were audio recorded in 60 minutes each. Informants were interviewed in Bahasa Indonesia or Javanese language depend on their proficiency. The reflective field notes also conducted to observe the informants' gestures and tone of voice.

## DATA ANALYSIS

All of the audio interviews recorded were transcribed by research assistants using qualitative content analysis. The data analysis involved seven female sex workers with HIV/AIDS as the key informants. The interviews were analysed individually to identify the relating theme with the aims of the study. For each transcription, the issues related to the aims of the study were identified and coded without predefined themes. After all of the coding process finished then classified the theme based on the theorithical framework using health belief model (HBM) theory. Perceived susceptibility, perceived severity, perceived benefits, and perceived barriers were classified as the theme.

**Ethical Consideration:** Female sex workers are groups that are vulnerable to get disease risk, gender issues, and stigma also discrimination. It was very important that the researcher have to protect the rights. The study was approved by the research ethical committee of Universitas Ahmad Dahlan with Number 011801013

**Findings:** Our data tell the perspective about HIV/AIDS among seven female sex workers aged from 18-28 years old. Six of them are working in the brothel and the other one as the karaoke server. All of the informants in anti retroviral treatment and the know their HIV/AIDS status more than a year by the HIV/AIDS testing.

### Perceived Susceptibility

**Sub theme : Fee of services** From the findings, the average number of guests served by each informant varied from 2-3 guests per night, but did not rule out not getting guests at all. There is a difference in the duration of in-room service between WPS located in Sarkem and Bong Suwung. If in Sarkem duration spent for one guest about 1 hour outside accompany karaoke with an average cost of Rp. 500.000, -. As for the Bong Suwung because there is no karaokenya place and the room used cannot be used long because there are still others waiting to use the same room, the same mattress, and the same bedspread, then the duration is usually short maximum of 10-15 minutes with cost IDR 80.000, - to IDR 100.000,.

“... so who has a room just provide only room so female sex workers bring tissue or what else like soap should be provide by ourselves sometimes we have to bring bed cover because the bed cover already used to more than one people.” (I-2). “(I-2)

**Sub theme: Sexual services** Based on several types of services provided to guests, the majority of informants only served the type of vaginal sex and do not accept requests outside of vaginal sex. Related competition among female sex workers,

According to informants there is competition among WPS in getting customers.

“... there is competition. Sometimes there is a friend who tells my weaknesses. When the client ask me about the truth so I answered you want to use me or her, but if you believe me the same let's go “I'm so.” (I-3)

Informants have diverse perceptions of the risks faced by a female sex worker. One informant admitted embarrassed to work as a female sex worker, but it was forced to do to meet the needs of his son. Informants are also aware that the work is not spared from the risk of getting sick, pregnant, and exposed to raids. The next informant explained that working as a female sex worker is risky and sinful but the informant is very pressured to do this work due to economic reasons. Informants do not know that the job is at risk for STIs. Other informants explained that working as female sex worker is not at risk of contracting venereal disease if female sex worker can prevent disease transmission well.

Based on findings about condom use when serving guests, there are two informants who suggested that always use condoms with reasons for the prevention of venereal disease and unwanted pregnancy. While other informants expressed that not always use condoms, condom use depends on guest demand. HIV positive female sex workers are still receiving guests.

“Sometimes I do not use condom, it depends on the request of my clients. They do not satisfied with my service if use condom.” (I-1)

**Sub Theme: Perceived Severity** The majority of informants perceived that Sexually Transmitted Infections (STIs) including HIV/AIDS are a dangerous disease. But there were two informants who thought that STIs including HIV/AIDS were not a dangerous disease because there were already drugs that could be taken regularly.

“It is not a dangerous disease. There is a drug for it, we just have to consume it regularly..every day..every time for the rest of our life.” (I-2)

**Sub Theme: Perceived Barriers** Based on the findings, the majority of informants did not feel any obstacles in accessing health services. But there was one informant who explained that he had experienced discrimination stigma from health workers at a government health care facility.

“She was a new doctor who gave treatment for me, she was treat me without any smile at her face, she was rude..and I reported her to her boss in the office.” (I-1)

Based on the findings, according to the informants the reason why not all the female sex workers want to check their health is due to the following factors: 1) low self-awareness, 2) female sex workers already know

their health status so ashamed to check their health, 3) if the partner knows his health status, 4) health checks are considered not yet a necessity.

## DISCUSSION

Female sex workers in this study realized that the work undertaken is very vulnerable to contracting HIV/AIDS. However, not all informants we interviewed used condoms during sexual intercourse with their clients. This happens because the bargaining power between informants and clients has not been strong. The informant will fulfill the client's desire not to use condoms with the requirement to add the cost of sexual services.<sup>7</sup>

Stigma and discrimination are still a problem for female sex workers. This was evidenced by the results of interviews that explained that informants had experienced "patient friendly" treatment from health workers because they knew the health status of an HIV positive patient.<sup>8</sup> The same situation also happened to female sex workers in Zambia. Stigma and discrimination cause a female sex worker to be reluctant to check health conditions, including VCT. In this case, the role of peer educator is very important to provide education, spirit, and intensive assistance to the female sex workers who become assisted and increase social network capacity to health care workers. In addition, couples female sex worker should also give encouragement to perform regular health checks.<sup>9</sup>

Stigma is influenced by several factors, namely knowledge, money, power, prestige to prevent access to health services to patients and access to disease prevention services.<sup>10</sup> Consistent use of condoms in female sex workers has not been done by all informants in this study. In this study there were still informants who did not use condoms while having sexual relations with clients. This is influenced by the reason that clients feel uncomfortable when having sex without using condoms and the addition of the cost of sexual services provided by the client to the informant.

According to the health belief model (HBM) as one of the most reliable behavioral theories explaining the pathway of behavioral change in high-risk populations, The way to change in people's attitude would lead to change in their behavior through influencing the components including: perceived susceptibility, perceived severity, perceived benefit, and perceived

barriers.<sup>11</sup> Most of Iranian PLWHA acquired their knowledge of unsafe sex consequences might have influenced the "perceived severity" of the disease and it would be lead to consistent of condom use among them.

Some studies explained that women are more vulnerable to HIV/AIDS than men.<sup>12</sup> Other study mentioned that "partner's condom refusal" was the main point of condom non-use among women living with HIV/AIDS. "My partner did not want to use a condom" is a common self-reported reason for condom non-use among PLWHA.<sup>13</sup> Based on the facts it seems that more interventions are needed to empower Iranian women on condom use bargaining, especially to explain them about their reproductive health rights (such as refusing sex without condom) in their sexual relationships.<sup>14,15</sup>

**Limitations of the Study:** The study did not explore about the experience of the informants about stigma and discrimination to get health services, myths of the female sex workers to prevent and also cure the sexually transmitted infections (STIs) and HIV/AIDS.

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**Conflict of Interest:** We declare that there is no conflict of interest in this research

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# The Characteristic of Several Infant Mortality Risk Factors in Batang District

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## ABSTRACT

**Background:** Sustainable Development Goals (SDGs) contain a set of transformative goals which is agreed and applicable to all nations without exception containing 17 goals, which carrying 14 indicators are not achieved. Some of the indicators that are not reached include Infant Mortality Rate, IMR in Batang Regency is ranked as the sixth highest in Central Java with 13.42 per 1000 births. The purpose of this study was to investigate the characteristics of several risk factors for infant mortality in Batang Regency. The research method was descriptive analytic design, using questioner to 19 public health centers with 266 respondents. The research results showed that 106 (39.8%) respondents had poor knowledge about pregnancy and labour, 49 (18.4%) respondents had history of maternal diseases, 42 (15.8%) respondents are  $\leq 20$  years old when labour, 44 (16.5%) respondents had medical history in previous pregnancies, and 83 (31.3%) respondents had current medical history of pregnancies. There are 59 (22.2%) respondents were found labour with risky conditions, such as asphyxia and LBW (Low Birth Weight), and the age of the baby at preterm birth. 51 (19.2%) respondents chose non-health services maternity place with a birth attendant.

**Conclusion:** Maternal knowledge about pregnancy and healthy labour, labour obstacle conditions, neonatal health status, and birth attendant are risk factors for infant mortality. **Suggestions** are needed for massive EIC on MCH (Maternal and Child Health) material on primary target, pregnancy screening high risk in pregnant mother class, and massive education for health personnel as birth attendant.

**Keywords:** characteristics, risk factors, infant mortality

## INTRODUCTION

Starting in 2016, sustainable development goals (SDGs) 2015-2030 replace formally the Millennium Development Goals (MDGs) 2000-2015. SDGs contain a set of transformative goals that are agreed upon and applicable to all nations without exception. SDGs contain 17 Goals. The 17 goals are <sup>(1)</sup> :

1. Eliminating poverty,
2. Ending hunger,
3. Health and wellbeing,

4. Good education quality,
5. Gender equality,
6. Clean water and sanitation,
7. Access to affordable energy,
8. Economic growth,
9. Innovation and infrastructure,
10. Reducing inequality,
11. Sustainable development,
12. Sustainable consumption and production,
13. Preventing the impacts of climate change,
14. Maintaining marine resources,
15. Maintaining terrestrial ecosystems,
16. Justice,
17. Revitalization and global partnership which have 169 targets with approximately 300 indicators.

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Sustainable development (SDGs) 2015-2030 replace formally the Millennium Development Goals (MDGs) 2000-2015 <sup>(2)</sup>. However, in 8 Millennium Development Goals that have 63 MDGs indicators, 13 indicators have been achieved, 36 indicators are in the process of achievement, while 14 indicators are not achieved. Some of the indicators that are not achieved on MDGs related to health namely the reduction of maternal mortality rate (MMR), infant mortality rate (IMR), neonates mortality rate (NMR), HIV / AIDS, TB and malaria, access to reproductive health services, family planning, and scope of drinking water and sanitation.

The infant mortality rate (IMR) in Batang regency was ranked the sixth highest in Central Java with an IMR of 13.42 per 1000 births. Both maternal mortality and infant mortality rates in Batang regency indicate that an in-depth study of these two mortality indicators is needed since these two indicators are a benchmark for the good quality or not of health services in an area. The higher degree of maternal and child health, the higher degree of public health in the area.

There are two causes of infant mortality namely endogenous and exogenous. Endogenous infant mortality or neonatal mortality is caused by factors brought by the child at birth, obtained from the parents at the time of conception <sup>(3,4)</sup>. According to <sup>(5)</sup> infant mortality caused by the condition of her own baby that is LBW (Low Birth Weight), premature baby, and congenital abnormalities. <sup>(3)</sup> said, infant mortality brought by baby from birth is asphyxia. While exogenous infant mortality or post-neonatal mortality is caused by factors related to the influences of external environment <sup>(4)</sup>

**METHOD**

The design of this study is descriptive analytic, using questionnaires in 19 public health centre in Batang Regency <sup>(6)</sup> with 266 respondents in 19 public health center, those were :

- 1. Wonotunggal
- 2. Tersono
- 3. Bandar I
- 4. Gringsing I
- 5. Bandar II
- 6. Gringsing II
- 7. Blado I
- 8. Limpung
- 9. Blado II
- 10. Banyuputih
- 11. Reban
- 12. Subah

- 13. Bawang
- 14. Pecalungan
- 15. Batang I
- 16. Warungasem
- 17. Batang II
- 18. Batang IV
- 19. Batang III

Research ethics is guaranteed by filling in informed consent by respondents. The study variables included maternal factors, neonatal factors, and health services. Maternal factors consist of maternal knowledge about pregnancy and childbirth, history of maternal diseases, maternal age at labour, medical history in previous pregnancy, and current medical history of pregnancy. Neonatal factors include the condition of the baby born, such as asphyxia and LBW (Low Birth Weight), and the baby’s age at birth.

**RESULT**

Characteristics of respondents involve the age, occupation, income, number of family members, based on the results of data collection are described below.

**Table 1: Respondents’ characteristics**

Variable	Category	Total
The average age		29,53 ± 7,23 (15-45)
Occupation	Unemployment	226 (85%)
	Employment	40 (15%)
Income	≥ UMR	151 (56,8%)
	< UMR	115 (43,2%)
The average number of family member		4 ± 1,5 (2-9)

The study of the determinants of IMR in this study included maternal factors, neonatal factors, and intermediate factors. Maternal factors studied include: maternal knowledge and condition at labour. Neonatal factors studied were the condition and age of the baby at birth. Intermediate factors studied were maternity and birth attendant.

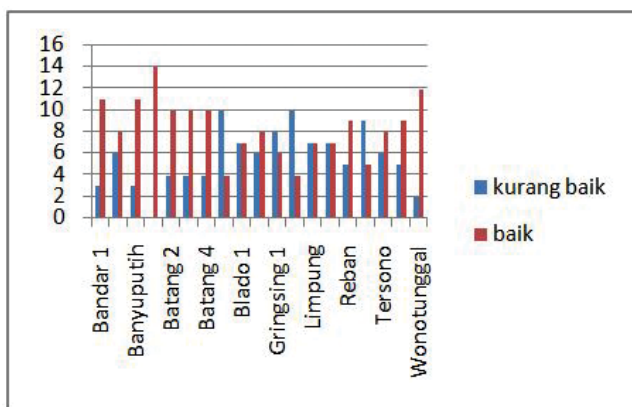
**1. Maternal factors:** Maternal factors of infant mortality studied in this study are shown in Table 2 below.

**Table 2: IMR maternal factors**

Variable	Category	Total
Mother’s knowledge	Bad	106 (39,8%)
	Good	160 (60,2%)

Conted...

Complication at labour	Negative	217 (81,6%)
	Positive	49 (18,4%)
Maternal age at labour	≥ 20	224 (84,2%)
	< 20	42 (15,8%)
Pre-pregnancy medical history	Not at risk	222 (83,5%)
	at risk	44 (16,5%)
Current pregnancy medical history	Not at risk	182 (68,7%)
	at risk	83 (31,3%)



**Figure 1: Distribution of respondents' knowledge in 19 public health centers in Batang District**

A total of 49 (18.4%) of respondents had history of maternal diseases, 42 (15.8%) of respondents were less than 20 years old when labour, 44 (16.5%) had medical history in previous pregnancies, and 83 (31, 3%) of respondents had current pregnancy medical histories. The maternal complications studied include labour obstacles, fetal distress, breech, and bleeding. Medical histories at previous pregnancies studied were abortion, premature, cesarean, and preeclampsia. Current medical histories of pregnancy include hypertension, anemia, diabetes, and obesity.

**2. Neonatal & intermediate factors:** Neonatal and intermediate factors of infant mortality rates studied in this study are shown in Table 3 below.

**Table 3: Neonatal & Intermediate factors**

Variable	Category	Total
Neonatal factors	Not at risk	207 (77,8%)
	at risk (babies born at risk/less birth age)	59 (22,2%)
Intermediate factors	Not at risk	215 (80,8%)
	at risk (non health service place of birth/ birth attendant)	51 (19,2%)

A total of 59 (22.2%) of respondents were found to labour with risky conditions, such as asphyxia and LBW, and the baby's age at birth is less (premature). A total of 51 (19.2%) of respondents chose a non-health service maternity place and or use a birth attendant.

## DISCUSSION

The determinant research of IMR was done in 19 public health centers with the number of respondents as many as 266 women of childbearing age and fertile age couples. The average age of respondents when the study are mature,  $29.53 \pm 7.23$  with the youngest respondent is 15 years old, and the oldest is 45 years old. There were 85% unemployment respondents, but 56.8% family income more than or equal to UMR. It was found that the average family of respondents is still ideal, ie  $4 \pm 1.5$  although still found the most number of family members were 9 people.

The result of the study of maternal factors, the characteristics of PUS WUS respondents in the working area of 19 public health centers in Batang regency showed both the average knowledge, the history of maternal complications during labour, maternal age at labour, previous medical history of pregnancy, and current pregnancy history showed good or not at risk of IMR. Although it was good, still found that 39.8% of respondents were less knowledgeable, 18.4% had history of labour complications, 15.8% were under 20 years old when labour, 16.5% had at risk previous pregnancy history, and 31.3 % have risk current pregnancy history. This will likely reappear infant mortality if the program is not monitored properly. The maternal complications studied include labour obstacles, fetal distress, breech, and bleeding. Medical histories in previous pregnancies studied were abortion, premature, cesarean, and preeclampsia. Current medical histories in pregnancy include hypertension, anemia, diabetes, and obesity.

Referring the knowledge distribution of respondents in 19 public health centers, there are 4 public health centers those are actually respondents' knowledge are still not good, namely Bawang, Gringsing 1, Gringsing 2, and Subah public health centers. Meanwhile, there are also 100% of well-informed respondents, namely Batang 1 public health center.

In neonatal factors, there were 59 (22.2%) respondents found to have babies with risky conditions, such as asphyxia and LBW, and the age of infants at

birth is less (premature). Neonatal factors are included in endogenous factors. Endogenous infant mortality or neonatal mortality is caused by factors brought by the child at birth, obtained from the parents at the time of conception (4,7). The endogenous factors appear related to maternal health during pregnancy. Infant mortality caused by the condition of the baby itself is usually LBW, premature infant, congenital abnormalities and asphyxia (4).

According to (7-9) mother's knowledge is very important to guarantee the health of mother and baby, since as foundation of mother awareness to see midwife; planning a pregnancy; distance of pregnancy; nutritional intake for mother and baby; food hygiene consumed by mother; as well as adequate sanitation and hygiene facilities.

Besides maternal internal factors related to IMR, there are maternal factors that are difficult to identify which also have an opportunity for infant mortality, such as physical factors; psychological factors; environmental, social, and cultural factors. (3,5,10)

While the intermediate factors, there are still 51 (19.2%) of respondents chose a non-health services maternity place and or with a birth attendant.

## CONCLUSION AND SUGGESTION

Several factors of IMR in Batang Regency include pregnant mother's knowledge about pregnancy and healthy labour, labour complication condition, neonatal health status, and birth attendant.

Massive KIE is required on MCH (Maternal and Child Health) materials on primary targets, pregnancy screening high risk in the class of pregnant women, and massive education health personnel as birth attendants.

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**Conflict of Interest:** The authors declare no conflict of interest

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# Selection of Birth Attendant of Labor in The Village Pelangiran Inhil District

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## ABSTRACT

In 2013, the percentage of deliveries with health workers in Indonesia is 89%, Riau Province in 2013 reaches 78%, at Pelangiran Public Health Centers in 2013 which is 55%. This study aims to determine the relationship of knowledge, access to health facilities, attitudes, traditions, family income, education, with the selection of birth attendants in the Village Pelangiran Inhil District. The type of research used is quantitative with cross sectional design. The sample of all maternity mothers, both assisted by health workers, and non-health workers (Shaman giving birth) from January 2015-March 2016 amounted to 95 people, with a technique of sampling saturated/census. The analysis used chi square. The result of this research shows that there are correlation between Knowledge (p value 0,001), POR = 11,333, attitude (p value = 0,001), POR = 58, 767, family income (p value = 0,002), POR = 4,589, education (p value = 0,001), POR = 7.699, and access to health facility (p value = 0,05), POR = 2,338, with selection of birth attendant. The attitude of the give a positive response to traditional healers are influential in the selection of birth attendants. A positive mother's attitude to a shaman is at risk 59 times to choose non-health workers as a birth helper. Advised health care workers who are in primary Pelangiran to improve counseling on birth mothers about birthattendant selection that birth mothers choose health workers as helpers.

**Keywords:** *selection of birth attendants, Pelangiran*

## INTRODUCTION

Childbirth is a process of spending the products of conception (fetus and uterine) which has been quite a month or can live outside the womb through the birth canal or through another birth canal, with or without the help of (its own strength).<sup>1</sup>

World Health Organization (WHO) states that most maternal deaths occur from complications during pregnancy, childbirth and 42 days after childbirth. The WHO estimates that 585,000 women die every day from complications of pregnancy and childbirth that not safe, in south Asia woman likely 1:8 die as a result of

pregnancy or childbirth during life, in African countries 1:14, while in North America only 1:6366.<sup>2,3</sup>

Maternal Mortality Rate (MMR) is one indicator that is closely linked to the quality and accessibility. Based on the Indonesian Demographic and Health Survey (IDHS) in 2012 related to pregnancy, childbirth, postpartum, MMR as much as 359 per 100,000 live births. Increase compared to 2007 amounted to 228 per 100,000 live births. This figure is still high when compared with other Asean countries.<sup>4,5</sup>

Analysis of maternal mortality conducted in the Rector General of Maternal Health in 2010 proved that maternal mortality is closely related to the place or birth attendants and health care facilities, births attended proven health personnel contributed to the decline in the risk of maternal mortality.<sup>6</sup>

Scope of delivery assistance by health personnel in Indonesia has increased every year. Nationwide coverage

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in 2014 is equal to 88.68% where this number can't meet the target of the Ministry of Health in 2014 at about 90%. However, in Indonesia, namely the province with the lowest coverage is West Papua (44.73%), Maluku (46.90%) and Papua (63.15%) and Riau (77.39%).<sup>4</sup>

Higher proportion of women experiencing pregnancy wastage in any defined area is considered as a sensitive indicator of maternal health care services. It is a significant public health problem throughout the world especially in the developing countries.<sup>7</sup> Pregnancy wastage mainly includes early pregnancy losses (abortions) and stillbirths. Actual incidence of abortions is not known. It is estimated that 30-55 million abortions take place worldwide annually which translates into an abortion ratio of 260-450 per 1000 live births. In India, it has been computed that about 6 million abortions take place every year, out of which 4 million are induced and 2 million are spontaneous. Still birth rate for developed countries is estimated to be much less i.e., 4.2- 6.8 per 1000 births whereas for developing world, the estimate ranges from 20-32 per 1000 live births<sup>8</sup>

Pregnancy outcome is influenced by hereditary, environmental and bio-social factors like maternal age, inter pregnancy interval, parity, socio-economic factors, Abstract To study the association of maternal risk factors with pregnancy wastage, a prospective study was conducted for a period of one year among 305 pregnant rural women registered with fifty Anganwadi centres in field practice area of Department of Community Medicine, GMC Jammu. All the potential participants were interviewed in person using semi-structured, pre-tested proforma and evaluated clinically. All pregnant women were then followed to study the outcome in terms of abortion, live birth or still birth. Various maternal risk factors like anaemia, Hypertension, Ante partum Haemorrhage, Albuminuria, Glucosuria were studied and their association with pregnancy wastage was analysed using chi-square test. Out of 305 pregnancies followed, 43(14.1%) ended in pregnancy loss i.e. 34 abortions and 9 still births. Pregnancy wastage was statistically significantly associated with anaemia, H.T., APH and Glucosuria. Anaemia was found to independently affect adverse pregnancy outcome on multivariate

analysis. Pregnancy wastage in our set up is mainly due to preventable and treatable risk factors which should be taken care of to prevent the wastage. Key Words Pregnancy wastage, Maternal Risk Factors, Prospective Introduction education, availability of health services, past obstetrics history etc. Besides that, maternal illnesses like diabetes, Hypertension, Ante partum haemorrhage, anaemia, infections etc. are common obstetric factors responsible for poor pregnancy outcome<sup>9</sup>

Based on research conducted that of the 31 respondents, 20 people (64.5%) who chose birth attended by TBAs, while 11 (35.5%) who chose mother giving birth by health workers, variable relating that knowledge, education, ancestry income, access to health facilities, the attitude, the selection of aid delivery.<sup>10</sup>

The percentage of births attended health personnel (health workers) in Riau Province in 2013 reached 78%. This figure does not meet the target of the Strategic Plan of Riau Provincial Health Office in 2013 amounted to 90%. The achievement of this indicator in the last 5 years shows a positive trend that is 88.4% in 2009. In Indragiri Hilir with performance of 77.2%. Subdistrict Pelangiran 50%. Pelangiran village is one of 16 villages in Puskesmas Pelangiran working area.<sup>11</sup>

From the initial survey conducted by researchers 5 mothers who were helped by non-health workers (TBAs) in the village of Pelangiran stated that the reason they chose TBAs as a birth attendant is with consideration cheaper and easier summoned to the house, a tradition handed down from old, lack of knowledge, poor education, and access to health facilities.

## METHOD

This research is a quantitative analytical research using cross sectional design conducted in Public health centre Pelangiran Inhil district in January-June 2016. The population in this study were all women giving birth in 2015 as many as 95 peoples. sample of 95 peoples. Sampling techniques are census or sample saturated. The analysis used the analysis of univariate and bivariate analysis.

## RESULTS AND DISCUSSIONS

## Result

Table 1: Results Bivariate Analysis of Each Variables

Variables	Selection of Childbirth				Total		P value	POR
	Non-health workers		health workers		n	%		
	n	%	n	%				
<b>Knowledge</b>								
Low	34	79,1	9	20,9	43	100	0,001	11,333 (4,312-29,787)
High	13	25	34	75	52	100		
	47	49,5	48	50,5	95	100		
<b>Access</b>								
Far	36	56,3	28	43,8	64	100	0,093	2,338 (964-5,670)
Close	11	35,5	20	64,5	31	100		
	47	49,5	48	50,5	95	100		
<b>Attitude</b>								
Negative	41	89,1	5	10,9	46	100	0,001	58,767 (16,643-207,503)
Positive	6	12,2	45	87,8	49	100		
	47	49,5	48	50,5	95	100		
<b>Tradition</b>								
Influence	31	52,5	28	47,5	59	100	0,579	1,384 (602-3,182)
No Influence	16	44,4	20	55,6	36	100		
	47	49,5	48	50,5	95	100		
<b>Family's Incomes</b>								
Low	38	62,3	23	37,7	61	100	0,002	4,589 (1,827-11,530)
High	9	26,5	25	73,5	34	100		
	47	49,4	48	50,5	95	100		
<b>Education</b>								
Low	38	69,1	17	30,9	55	100	0,001	7,699 (3,017-19,649)
High	9	22,5	31	77,1	45	100		
	47	49,5	48	50,5	95	100		

## DISCUSSION

**1. Knowledge:** The higher the person's knowledge, the more easily receive informations. With a mindset that is relatively high, the level of knowledge not merely know (know) that recall but able to understand (comprehention), even at the application level (user application) is the ability to use materials that have been studied on the situation or the actual conditions.<sup>12</sup>

Knowledge a person has gained not only in school but also can be obtained from various sources, such as electronic media, mass media, even from

close relatives and personal experience. This knowledge can form a belief that this knowledge can shape a behavior that is in accordance with what are believed.<sup>13</sup>

This study was supported by research conducted, the test results showed statistically significant correlation between a low knowledge by choosing birth attendants. Many mothers who choose non-health workers as a childbirth'shelter do not know the risks that will occur for the safety of mother and child. In addition, people also do not know the sterility of equipment that is in use by TBAs

against infection during delivery and postpartum mothers and infants. Mother only learned of the family and neighbors that gave birth to the TBAs are safe and secure, people prefer the convenience at the time of delivery with TBAs where before and after childbirth TBAs performing rituals such as sequence and herbalists care of her until after the birth, not only that TBAs also caring baby until the umbilical cord off.<sup>14</sup>

- 2. Attitude:** Attitude is a person's reaction or response to a stimulation or object that is emotional.<sup>15</sup> The tendency to act or do in social activities with a certain feeling in the objects reach a situation or conditions in the surrounding environment. In addition, it also provides responses attitude that is positive or negative to the object or situation.<sup>16</sup>

Communities thought by choosing TBAs as birth attendants then childbirth more comfortable and salvation is guaranteed because it has closed response and hard to accept the assumptions of others so that mothers are more likely to choose non-health workers as childbirth's helper. This study was supported by research Wilson (2010) on factors related to birth attendants in the district election Cibungbulang Bogor regency, West Java. Statistical test results showed that no significant relationship between attitudes to the election birth attendants.

Maternal expected to have a positive response so easily accept the assumptions of others. Expected for health workers to be able to approach and improve communication to invite mother giving birth so that all mother giving birth choose childbirth helper to health care.<sup>17</sup>

- 3. Revenue:** Socio-economic factors are still one of the obstacles people to give birth in health professionals (midwives). Communities with low or poor economy with low education seek help at the TBAs. They think that to give birth in health workers have to spend a huge cost, so they were reluctant to go to employment to health.<sup>18</sup>

Thus people who thought that TBAs is a hero, because bearing in cheaper TBAs, TBAs willing to be paid in goods (such as chickens or other agricultural produce), and payment can be in gradually. TBAs provide assistance in the form of massage in the mother, bathing the baby until the umbilical cord detached, and is seen in traditional

ceremonies, such as the tradition of salvation babies and postpartum mothers on day 7 - 40).<sup>19</sup>

The level of the economy is one of the factors that play a role in health for reasons not have money at the time to give birth, people prefer traditional treatment with a relatively low cost. For high-income people, regardless of health costs is often not a problem, but not the case for people who are not able to. Economic status of communities affected by several things: jobs, income and education.<sup>20</sup>

For that delivering mothers are advised to have health insurance as, Jamkesda and JKN (National Health Insurance) is a government program that aims to provide assurance of health insurance for all Indonesian people to be able to live healthy, productive and prosperous, so that mothers prefer delivery by health workers. For health care workers in order to make the program Tabulin that delivering mothers do not feel expensive if childbirth with health workers.

- 4. Education:** Education is an activity or process of learning and develop or enhance certain capabilities so that the educational goals that can stand on its own. The level of education also helped determine easily whether someone understands knowledge obtained, in general, the higher the education the higher the person's knowledge.<sup>12</sup>

Mother's education also influence the selection childbirth attendants, considering education can affect a person's intellectual power in deciding a case, including attending births.<sup>21</sup> Mother's education were less likely to cause mother's intellectual power is also limited so that its behavior is still influenced by the surrounding circumstances or behavior of other relatives or people they consider more experienced.<sup>22</sup> Mother's education here considered less if she only gained through junior high school diploma or other equivalent education to bottom, this study covers only 9 years of basic education. Whilst the new reproductive education is taught in more detail at the high school level and above.

Educational factors proven that mothers who had high school better attainment is above 80% health employment. While educated mothers elementary-



junior high school or do not choose births attended by non-health personnel (TBAs). That the higher the mother's education is expected able to accept new changes in the health sector which leads to improved health so that they can prepare themselves in pregnancy and childbirth than that education can affect a person's intellectual power in deciding the problem, including the determination of the birth attendant<sup>23</sup>.

- 5. Access to health facilities:** Based on the results of the study, that there is no significant relationship between access to health facilities with the selection birth attendant.<sup>24</sup> access to health facilities or physical access may be a reason to get a place in health care delivery and birthing with healthcare professional.

Access to health services related to several things including the distance of residence and travel time to health facilities as well as socio-economic status and culture.<sup>25</sup> Physical access can be a reason to get a place in health care delivery and birthing with healthcare professional.<sup>25</sup> Physical access can be calculated from the travel time, mileage, type of transport and health care conditions such as type of service, health workers are available and hours of service. Location services are not strategies or difficult to reach causing the lack of access of pregnant women who give birth in health facilities. Travel time to the health service has a relationship with the delivery of health, said distance and time that must be taken to get the service delivery assistance, ratings are categorized as "Far" when distance is  $> 2$  km and travel time  $> 30$  minutes and "Close when distance  $\leq 2$  km and time mileage  $\leq 30$  minutes.

Based on the research results, there is no relationship between access to health facilities with the selection birth attendants, because the villagers Pelangiran just takes time approximately 60 minutes to go to the health facility. Other than that, besides distance mom's home with a TBAs's home very close, TBAs also ready to be called whenever the delivering mothers in need. For that is expected to mothers in order to birthing health facility. For health workers in order to stay in the village so that the delivering mothers easy to give birth to a health facility.

- 6. Tradition:** The tradition is still held by people in rural areas, and less implemented in urban areas. Confidence in the mystical, magical or spirit, often lead to destructive behavior. Villagers are still very strong against ceremonies or rituals. Trust as an element of culture is not easy to change. This element is difficult to be accepted by society, especially when it comes to ideology and philosophy of life. In addition to the difficult geographical, kinship factors are also influential in this regard. Close ties within the scope of its own family gives a sense of comfort for a mother to be birthing, so that a sense of comfort that appear when when their labor. Confidence in the customs and traditions that are passed down has been recognized by society also affect the mother's knowledge in terms of maternal and child health.<sup>26</sup>

The tradition of prenatal care, childbirth and postpartum, is still very important to do. This was further compounded by the existence of TBAs are still in trust by the community<sup>27</sup>

Based on the results of the study, there was no significant relationship between tradition and election birth attendants with value ( $p$  value = 0.579), because most of the Pelangiran's villagers prefer the convenience at the time of birthing with a TBAs because people learned from family traditions for generations, TBAs give ritual form of water that is considered to expedite delivery if obstructed labor and can reduce pain. In addition, TBAs also provide care during delivery such as massaging the waist of mother, postpartum care until the baby's umbilical cord off.

For it is expected that the birth mothers to not follow the hereditary tradition that could endanger the safety of the mother and fetus. For health care workers in order to provide counseling so that birth mothers are not affected to follow the tradition that could threaten the safety of the mother and fetus while choosing health workers as a helper labor.

## CONCLUSIONS

1. There is a relationship between knowledge, attitudes, education and family income with the selection of village birth attendants in Pelangiran, Inhil District in 2016.

2. There was no relationship between access to health facilities and traditional birth attendants with the election in Pelangiran, Inhil District 2016

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3. Head of Pelangiran Village, Inhil Regency

**Ethical Clearance:** Research must uphold research ethics which is an ethical standard in conducting research. There are also principles of research ethics:

- 1. The principle of respecting human dignity:** I as a researcher will respect the rights of respondents involved in the research, including: the right to make a decision to be involved or not involved in the research and the right to be kept confidential in relation to the data obtained during the study.
- 2. The principle of turning back (beneficence):** This research will not endanger the respondent because the research guarantees to maintain the confidentiality of respondents in filling out the questionnaire. This research is free from exploitation because researchers have considered the benefits of research and considered the risks and benefits of research that have been conducted by ethical testing by Stikes Hangtuah Pekanbaru.
- 3. Principles of Justice:** In this case the researcher will treat respondents fairly and not discriminate based on race, religion, or socioeconomic status. Researchers will treat respondents in accordance with the research design and research objectives, including the right to get the same treatment and the right to be protected by privacy. Ethics review by the Hangtuah STIKES ethics commission in Pekanbaru has been carried out, as evidenced by the ethical review letter with number : 090/KEPK/STIKes-HTP/X/2018

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# Community Behavior towards Filariasis Mass Drug Administration in Tegaldowo Village, Pekalongan District, Indonesia

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## ABSTRACT

Mass drug administration (MDA) is a strategy to reduce lymphatic filariasis (LF) transmission, and finally eliminate it. This study aimed to identify community behavior towards MDA and the role of elimination officer in MDA campaign. This was a descriptive cross-sectional study conducted in Tegaldowo village, Pekalongan District (an endemic area of LF). Study subject consisted of 100 persons. LF was detected by ICT filariasis using finger blood. The result most of the subjects were female, who did not go to school, worked as laborer, and married. Prevalence of filariasis was 7.0%. Most subjects had good knowledge toward MDA and received drugs during MDA. Among subjects who received drugs, only 8.6% refused to take the drugs due to breastfeeding. Adverse reaction was also the case in Tegaldowo, 40,0% subjects experienced adverse reaction after taking the drugs. Less than half cadres had good performance as elimination officers/drug distributors. Most of the subject gained information about MDA from health officers (34.4%). However, nearly half (43.0%) of subjects admitted they did not receive any information about MDA. This study concluded the prevalence of filariasis in Tegaldowo Village has not met WHO target. Factor that may be associated with the coverage of mass drug administration was lack of MDA campaign.

**Keywords:** mass drug administration, elimination officer, adherence, adverse reaction

## INTRODUCTION

Lymphatic filariasis (LF) is a chronic disease in most of tropical countries. It caused by filarial worms *Wucheria bancrofti*, *Brugia malayi* and *Brugia timori*.<sup>1,2</sup> Filariasis rarely caused death in human, but it caused permanent disability.<sup>3</sup> The disease also affecting to the quality of life due to the loss of productivity, significant cost, and social stigma.<sup>4</sup> More than 125 million people in Indonesia are at risk of LF infection living in 337

districts, which are endemic of LF.<sup>5</sup> Pekalongan is an endemic area of LF in Central Java Province. The number of filariasis cases in Pekalongan (2016) were 108 cases, 38 of them were new cases.<sup>6</sup>

Lymphatic filariasis is targeted for elimination through mass drug administration (MDA). A micro-simulation model to determine the effect of MDA in the reduction of LF transmission demonstrated a number of MDA round is necessary to achieve elimination.<sup>7</sup> The compliance of community during MDA is needed to achieve LF elimination. MDAs were mainly conducted by involved community volunteers as elimination officer, either from the community (cadres) or from public health center (health officers). But combination of different groups of people was reported to be more effective to achieve high coverage of the treatment.<sup>8,9</sup>

Pekalongan District has been conducted MDA in 2011-2015. However, our previous study revealed

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there was ongoing transmission in the area. Most cases were found in Tegaldowo Village.<sup>10</sup> This study aimed to describe the community behaviour toward MDA filariasis in Tegaldowo village, Pekalongam District, Central Java

### METHOD

This research using a descriptive cross-sectional study design, conducted in June-August 2017. Study was located in Tegaldowo village, Pekalongam District, which is an endemic area of filariasis. This study involved 100 subjects, selected using consecutive sampling, i.e subject that came to the health checkpoint during study. Data collected using questionnaire. Study variables consisted of characteristic (sex, education level, occupation, marital status), LF infection (identified by immunochromatographic tesse/ICT), community behavior toward MDA (knowledge, receive drugs, reason not receive it, compliance, reason for non-compliance, time of taking the drug, side effect, action when side effect occurs), and source of information (from who, when, where, how many).

### RESULTS AND DISCUSSION

Characteristics of subject are shown in Table 1.

**Table 1: The characteristic of the subjects**

Characteristic		n = 100	%
Sex	Male	20	20.0
	Female	80	80.0
Education Levels	No School	44	44.0
	Elementary School	39	39.0
	Junior High School	14	14.0
	Senior High School	3	3.0
Occupation	Farmer	1	1.0
	Labourer	47	47.0
	Non-government employee	3	3.0
	Entrepreneur	6	6.0
	Pedicab driver	2	2.0
	Unemployed	41	41.0
Marital status	Married	82	82.0
	Divorce	11	11.0
	Single	7	7.0
Filariasis status	Positive	7	7.0
	Negative	93	93.0

The result showed that most of the subjects were female (80.0%), do not go to school (44.0%), working as laborer (47.0%), and have been married (82.0%). The study also revealed prevalence of filariasis was 7.0%. It shows that Tegaldowo Village was considered as LF endemic area. The effectiveness of MDA in reducing the prevalence of LF in the community is directly related to coverage with treatment.<sup>11</sup> Therefore, MDA is still needed in the area.

**Table 2: The community behaviour towards MDA**

Variables	n	%
<b>Knowledge toward MDA (n = 100)</b>		
Good	65	65.0
Poor	35	35.0
<b>Receive anti filariasis drugs during MDA (n = 100)</b>		
Yes	93	93.0
No	7	7.0
<b>Reason not receive anti filariasis drugs (n = 93)</b>		
Currently move to the village	1	14.3
Outside the village during MDA	4	57.1
Others	2	28.6
<b>Compliance (n = 93)</b>		
Yes	85	91.4
No	8	8.6
<b>The reason don't take anti filariasis drugs (n = 8)</b>		
Pregnant	2	25.0
Forget	1	12.5
Breast feeding	3	37.5
Feeling healthy	2	25.0
<b>When you take the filariasis drugs? (n = 93)</b>		
Before eat	2	2,4
After eat	79	92,9
Before go to bed	4	4,7
<b>Experience side effect (n = 85)</b>		
Yes	34	40,0
No	51	60,0
<b>What to do when experiencing side effect</b>		
Report to elimination officer	1	2,9
Go to Community Health Center	2	5,9
Take another drug to relief the pain	1	2,9
Ignore side effect	30	88,2

Table 2 showed that most subjects had good knowledge toward MDA. Only 7.0% subjects admitted they did not receive anti filariasis drugs, mostly either

because they were out of town during MDA or currently moved to the village. Compliance in Tegaldowo village was high (91.4%). This result was in accordance with previous study that demonstrated effective coverage rate was significantly higher in rural areas compared to the urban areas.<sup>12</sup> Other study in Srilanka reported similar MDA coverage.<sup>13</sup>

Among subjects who received drugs in this study, 8.6% refused to take the drugs. Most of them mentioned breastfeeding as the reason for not taking anti filariasis drugs. This was on the contrary to Weerasooriya et al who reported the reason for not comply was because they did not receive the drugs (29.4%),<sup>13</sup> which was not the case in this study. Other study revealed the most common reason quoted for not consuming drugs was that they simply do not want to, followed by the fear of adverse drug reactions.<sup>12</sup>

In this current study, nearly half (40.0%) of them experienced side effect after taking the drugs. From the interview, subjects mentioned nausea, dizzy, fever, and others. This results are similar with the a previous study that reported dizziness, nausea, fever, and other symptom such as scrotal or chest pain.<sup>14</sup> Surprisingly, most of subject of this study decided to ignore their side effect (88.2%) and only a few went to public health center to seek treatment or reported the adverse reactions to the elimination officer. Although the adverse event of MDA was not severe, the previous study showed that the adverse event affected the compliance of the community toward MDA.<sup>15</sup>

Several previous studies mentioned the similar factors regarding to compliance during MDA. In total, 29 of the 36 reviewed studies reported factors associated with low compliance, the most common being fear of side effects, lack of perceived need for the drugs and being away from home when the drugs were delivered to relatives. These are similar to those found in a global review of compliance, whose five recommendations included tailoring programs to local conditions, minimizing the impact of adverse events and promoting the broader benefits of the MDA program.<sup>16</sup>

Almost all of the subjects took the drugs after eating (93.0%). Hal ini menunjukkan mereka tidak minum obat di hadapan petugas seperti yang dianjurkan dalam program. Hasil ini sesuai dengan penelitian sebelumnya, bahwa among those who had consumed the tablets, only

35 (8.0%) did that in front of the drug distributors. The most common reason for not consuming the tablets in front of drug distributors was that they had not taken food at the time of distribution.<sup>12</sup>

**Table 3: The source of information and role of elimination officers towards MDA**

Variables	n	%
<b>The role of elimination officer</b>		
Poor	52	52.0
Good	48	48.0
<b>Do you know there is MDA in your village?</b>		
Yes	93	93.0
No	7	7.0
<b>Who give information about MDA?</b>		
Cadres	21	22.6
Health officers	32	34.4
None	40	43.0
<b>Where you receive the information about MDA?</b>		
Home	3	3.2
Community Health Center	24	25.8
Public building	26	28.0
Others	40	43.0
<b>How many times subjects receive the information of MDA</b>		
1 times	31	33.3
2 times	32	34.4
3 times	13	14.0
More than 3 times	7	7.6
Forgot	10	10.7

Table 3 showed the study subjects mentioned less than half cadres had good performance as elimination officers/drug distributors. Most of the subject gained information about MDA from health officers (34.4%) during mass counselling such as in *posyandu* (integrated health service for under-five children). However, nearly half (43.0%) of subjects admitted they did not receive any information about MDA. From those who received information, subjects usually got the information from public health centre or other public buildings. A previous study found the related factors to the non-compliance of MDA mostly because of the health worker/drugs distributors has not visited their family (75.0%).<sup>17</sup> Gosh et al found the reason of MDA non-compliance was fear of the side effect of the drugs.<sup>18</sup>

## CONCLUSIONS

Prevalence of filariasis in Tegaldowo Village was 7.0%. This means MDA for filariasis in Tegaldowo village has not met WHO target. Factor that may be associated with the coverage of mass drug administration was lack of MDA campaign, either from health officers or cadres.

**Conflict of Interest:** The authors declare no conflicts of interest in this work.

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# MATES (Macaron Dates) as an Alternative Supplementary Food for Undernourished Toddler

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## ABSTRACT

Undernutrition still becomes serious health problem in Indonesia. One of strategies in order to replace nutritional status to become normal is by giving supplementary feeding. Dates is high energy high iron food that now can be easily found in urban area of Indonesia. Macaron is a sweet dessert that is basically made from almond, eggwhite, and sugar. Children usually can accept sweet food more easily, so modification of macarons with dates and governance's supplementary feeding biscuit can be good alternative food that deliver nutrients which are needed to support catch up growth in undernourished children. This research was aimed to assess acceptance of modified macarons as alternative supplementary food for undernourished toddler. This is true experimental study with complete randomized design. The substitution of repeatedly 0%, 13%, and 16% governance's supplementary feeding biscuit were made in order to increase nutrition value of macarons. The formulas then were tried to 25 toddler to assess acceptability of each formula using organoleptic test. The result then was analyzed using friedman test. This research showed that F2 (16% governance's supplementary feeding biscuit) has highest acceptability based on flavour variables ( $p < 0.05$ ). Also, this formula contains 8.9 g protein, which is close to protein value of governance's supplementary feeding biscuit. It can be concluded that modified macarons with 16% substitution of governance's supplementary feeding biscuit is a good alternative supplementary food for undernourished toddler

**Keywords:** macarons, supplementary feeding, undernutrition, toddler

## INTRODUCTION

First thousand days of life is essential window period for growth and development of human. As another developing countries, Indonesia still have a high burden of undernutrition. Gained data from Indonesian Basic Health Survey (RISKESDAS) 2013 showed the magnitude of undernutrition prevalence was 19.6%, consist of 13.9% wasting and 5.7% severe wasting<sup>1</sup>. This problem is happened everywhere, include urban area such as Surabaya City. Annual surveys showed that there are 282 cases of severe undernourished children in Surabaya<sup>2</sup>.

Infant and younger children especially in first 6 and 18 month of life has bigger chance to suffer malnutrition<sup>3</sup>. To bring back the normal nutrition status in malnourished children, the typical nutrition intervention is needed. The nutritional requirement of malnourished children is differ from non-malnourished ones. They need higher energy and essential nutrient such as protein than non-malnourished children in order to catch up the growth rate<sup>4</sup>.

In order to solve undernutrition problem, the Indonesian government's has a several therapeutic nutrition care program for undernourished children, one of them is supplementary feeding program in a form of biscuit. This program is done by giving 90 packages of biscuit that must be consumed by undernourished toddler during 90 days. The packages contains of 10 pieces of biscuits or equivalent with 120 g of biscuit<sup>5</sup>.

The supplementary biscuit is enriched with macro and micro nutrient formula that is important to support the catch-up growth for undernourished children. This

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biscuit only have one flavor, so consuming the same biscuit everyday could lead to boredom.

Naturally, human genetics encourages people to accept more sweetness than bitterness. Dislike for bitterness occurs as a protective instinct to avoid toxic consumption that usually has a bitter taste. On the contrary, the fruits that are the source of human food have a tendency that tend to be sweet<sup>6</sup>. Therefore, sweet food tend to be more accepted even by the children with strong taste aversion<sup>7</sup>. Moreover, the development of product for children need the involvement of the targeted consumer to determine the successfully product<sup>6</sup>.

Macaron is a traditional European food origin from France. Macaron comes from Italian language makarone, maccarone, or maccharone, and in 1950 it called Les Origines de la Langue Franciois which mean pasta and cheese product. Macaron is made from white egg, sugar, and almond flour. It has two shell shapes which have creamy filling in the middle<sup>8</sup>. Macaron have a nutty sweet taste. The sweet taste carried by macaron might be easily accepted by the children, so formulation of the macaron as the nutrient delivery food can be potential. However, the substitution of macaron have not been published before. In this study, the researchers want to assess the acceptance and nutrient value of macaron substituted with government's supplementary feeding biscuit as an alternative therapeutic feeding for undernourished children in Surabaya, Indonesia.

## METHOD

This is true experimental study design with completely randomized design. The three formula was developed in this research with five times of replication for each formula.

The research was done in September to November. The development of formula was held in Nutrition Laboratory, Faculty of Public Health, Universitas Airlangga, Indonesia.

The main ingredient of macarons was egg white, sugar, and almond flour as a standard formula. In the developed formula, as much as respectively 13% and 16% government's supplementary feeding biscuit (MP-ASI biscuit) to substitute the almond flour. Also, there was an addition of isolate protein to increase the nutrition value. The ingredient of each formula is describe in table

1. All the formulas filled with butter cream filling made from cream and dates. The composition and amount of added dates in butter cream were same for all formulas

The first step to process the formula was started by refining MP-ASI biscuit and almond flour. The flour then was mixed with sugar before was strained to smoothen the texture of the formula. The next step followed egg white stir for 5 minutes. The dry ingredient then was added to egg whites batter. The batter was poured onto baking sheet with diameter as big as 2.5 cm. The molded batter then was baked using oven in a 150°C for 20 minutes. The upper and lower temperature of the oven are the same. The macaron then was filled with butter cream with added dates.

The formulas then was tried to 25 pairs of toddlers (aged 12-36 months old) and the mothers as untrained panelists in order to assess organoleptic acceptance level of each formula including color, aroma, texture, and taste. The acceptance level for organoleptic indicators was measured using facial expression scale for the toddlers interpreted by the mothers. The best formula according to organoleptic parameters will be determined using friedman test ( $\alpha = 0.05$ ). The best formula based on organoleptic test then would be analyzed with laboratory test for the protein content with khjedal method. This research has been approved by Ethical Committee of Health Research, Public Health Faculty, Universitas Airlangga.

**Table 1: The formulation of developed product**

Composition (%)	Formula		
	F0	F1	F2
Almond flour	23	9.7	6.4
Sugar	28	28	28
Egg white	16	16	16
Butter	16.3	16.3	16.3
Dates	16.3	16.3	16.3
MP ASI biscuit	0	13	16
Isolate protein	0	1.6	1.6
Total	100	100	100

## RESULTS AND DISCUSSIONS

Supplementary feeding biscuit provided by Indonesia governance is a nutrition program which is given to low income family with severe underweight

children. Every children will get 90 packages of biscuit for 90 days. The nutrient content of the supplementary feeding biscuit can be seen in Table 2.

In order to create the alternative product that have the close nutrient value to product for government's supplementary feeding biscuit, the amount of 13% dan 16% substitution formula was made. This amount was arranged based on previous pre-eliminary study which found that minimal 10% of added biscuit didnot interfere the formula consistency and the result of the product. The addition of 1.6 protein isolate was used to increase the protein content of the macaron, because the heating process might reduce the protein content of food. The amount of added protein isolate was accorded to Indonesian National Standard (SNI) for supplementary feeding product, which is minimal 8 g of protein isolate per 100 kcal product<sup>9</sup>.

**Table 2: Nutrient Content per 100 g of Supplementary Feeding Biscuit (MP-ASI Biscuit)**

Nutrient Conten	Unit	MP-ASI Biscuit
Total energy	Kcal	450
Total fat	g	14
Protein	g	9
Total carbohydrate	g	71
Fiber	g	5
Sugar	g	13
Zinc	mg	2.57
Phospor	mg	5.36
Vitamin A	mcg	266.51
Vitamin D	mcg	4.71
Vitamin E	mg	5.62
Vitamin K	mcg	12.36
Vitamin B1	mg	0.47
Niacin	Mg	4.5

The acceptance measurement for this study was use hedonic test with likert scale based on facial expression. The toddler as well as the mother was given the formulas as much as 5 g per formula. The mothers then was asked to read the facial expresion of their kids and filled the questionnaire<sup>10</sup>.

**Texture:** One of crucial sensory parameter for the food product testing is texture perception. Even though, the factor that influence the texture preference are still least understood<sup>11</sup>. The International Standard Organization

defined texture as “all the mechanical, geometrical, and surface attributes of a product perceptible by means of mechanical, tactile, and where appropriate, visual, and auditory receptor”<sup>12</sup>.

The human body do not have specific receptor to define the texture of the food. The texture preferences is rated when the food is placed in the mouth. The chewing process is the most decisive process to define someone's texture contentment. The texture preference was also driven by the age. Babies and young children tend to refuse the food which are difficult to be manipulated in the mouth based on their stage of physical development and mouth behavior<sup>13,14</sup>.

All the standard and modified macaron formula has a little crunchy texture and chewy texture. The center of the shell have a cavity that facilitate the chewing process. The hedonic test showed that among the formulas, there were no significant differences in texture acceptance ( $p>0.05$ ). It indicated that the addition of 13% and 16% MP-ASI biscuit in macaron batter did not interfere the batter consistency, and at the end, the macaron texture acceptance.

**Aroma:** A study held by Monnery-Patris et al. showed that the food rejection in toddler might be influenced by the olfactory cues<sup>15</sup>. Another study described that the food liking in toddler was driven by the odor liking. This food liking correlated to odor liking was found stronger in 12 month olds and weaken after the toddler reach 22 month olds<sup>16</sup>.

Aroma of the F0 (basic formula) was dominated by almond flour and vanilla smell. The modified formula had sweet biscuit smell hint. The organoleptic and friedman test showed that there were no difference in aroma acceptance level among three formulas. The average score for aroma acceptance were 2 out of 3 points, so the aroma of the modified formula was quite acceptable.

**Color:** Visual exposure including color, appearance, and portion play important roles in stimulating the food preference. It is also influence the food choice, especially in children, so the appearance of the food is important in order to introduce the novel food to the children<sup>17</sup>.

Color is one of visual cues that play important role in the food acceptance. Color might affecting the expectation of appetizing of food, which could lead to

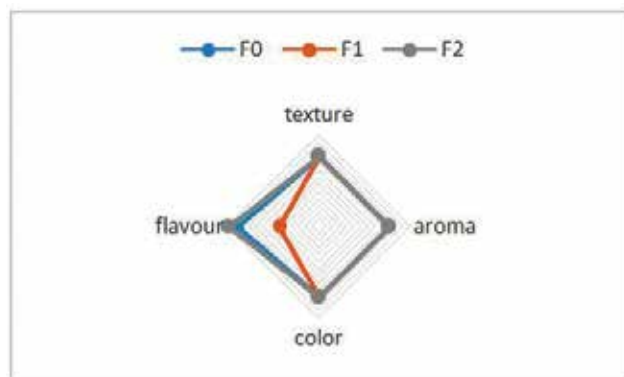
the food choice. The food color gave a perception of the food flavor<sup>18</sup>.

This research did not include the addition of the food coloring agent in order to keep the objectivity of the color acceptance among the formula. The Mates (Macaron Dates) have a cream-colored tone, and the substitution of the MP-ASI biscuit did not too much change the formula's color. Therefore the statistically analysis showed that there were no difference in food acceptance based on color variable ( $p > 0.05$ ).

**Flavor:** Many research showed that flavor is a key factor which driven the human's food choice. Naturally, human genetics encourages people to accept more sweetness than bitterness. Dislike for bitterness occurs as a protective instinct to avoid toxic consumption that usually has a bitter taste. On the contrary, the fruits that are the source of human food have a tendency that tend to be sweet<sup>6</sup>. Therefore, sweet food tend to be more accepted even by the children with strong taste aversion<sup>7</sup>.

The flavor of the macaron were dominantly sweet. This sweetness level were increased by the addition of MP-ASI biscuit since the biscuit also contain sugar. The children tend to like the sweet food, in this research, the highest acceptance was notably found in F2 formula (16% MP ASI).

**The acceptance of the formulas:** Based on the organoleptic indicators, the most favorable formula were F2 (16% MP-ASI biscuit) (Fig 1.). This research reinforced that the most key factor which driven the food acceptance among toddler was the taste variable. The substitution of almond flour with MP-ASI biscuit enhance the acceptance of the macaron.



**Figure 1: The acceptance of the formula**

The F2 formula contain 16% MP-ASI biscuit have a better acceptance compared with the other formula.

It is indicated that the sweeter the food taste, the more acceptable the food. Since the texture acceptance did not show the significant differences in the acceptance level, the increase proportion of MP-ASI biscuit substitution in the future research is potentially to be done. Otherwise, the use of facial expression scale in order to measure the acceptance of the toddler toward the formulas might be the limitation of this study. Since the toddler have not do the verbal communication effectively, the mother's perception of the toddler expression could be misleading.

**Nutrient content:** Beside the acceptance of the food product, the nutrient content should be the first consideration in developing specialized formula for undernourished children. The laboratory test showed that the F2 formula contains 8.9 g protein per 100 g formula. The number of protein from the laboratory test declined compared to the indirect protein equation based on Indonesia Food Composition Table (DKBM). Indirect equation showed that protein content per 100 g macaron should be 18 g. This might due to the cooking process of the macarons which used high temperature. The high temperature and the length of the cooking time might break chemical boundaries of the protein and make the protein content decrease<sup>19</sup>.

The protein content were slightly below the WHO recommendation standard for supplementary feeding for moderate malnourished children which required the protein value as much as 20 g per 1000 Kcal. This formula contain 18.7 g protein per 1000 Kcal<sup>4</sup>. Although there were a decrease in protein content in the best formula, the protein content of the F2 were closed to government's MP-ASI biscuit (8.9 vs 9 g per 100 g). So, it can be conclude that F2 can be a good alternative supplementary feeding for undernourished children.

## CONCLUSIONS

There were a differences in flavor indicator among the formula, but not in texture, aroma, and color acceptability. The most acceptable formula is F2 (16% MP-ASI biscuit). The F2 formula (16% MP-ASI biscuit) have a close protein content to government's MP-ASI biscuit (8.9 vs 9 g). Therefore, this value is still below the WHO recommendation for moderate undernutrition children.

The modification of macaron substituted with supplementary feeding biscuit can be a potential alternative for undernourished children in Indonesia, especially

in urban area where the ingredients of macaron can be easily found. Further research with higher proportion of MP-ASI biscuit can be potentially done to increase the nutrient value of snack for undernourished children.

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**Ethical Clearance:** The protocol of the study was consider ethical issues based on Helsinky Agreement. This study had been reviewed and supervised by Institutional Review Board Faculty of Public Health Universitas Airlangga

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# Differences of Family Support and Iron Tablets Consumed Post Pregnant Women Classes and Midwives Counseling

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## ABSTRACT

Year 2013, nutritional anemia prevalence in Indonesia pregnant women as 37,1%. Various efforts to handle it, obiter improving prenatal care by health personnel, involving families in pregnant women classes and midwives counseling. Research aims to know the difference of family support and amount iron tablets consumed between two intervention. Quasi experiments were performed with two groups, post test only. Population of all pregnant women in Sukasari Health Center who have received first prenatal care and 30 iron tablets for a month, regardless of gestational age and anemia status. First group intervention with 30 pregnant women attended pregnant women class with their families, the second with 30 pregnant women received midwife counseling with their families. Data collection one month later, through interview and see tablet compliance card. The results, 56,7% pregnant women received high category family support for checking pregnancy and 63,3% to consume iron tablets, same as two groups. As 60% pregnant women in first group consumed 30 iron tablets, in second group 93,3%. Mann Whitney different test of two groups showed no significant difference ( $p>0,05$ ) family support for prenatal care and consume iron tablets, also based on husband educational and occupation. There's significant differences ( $p0,003$ ) the number of iron tablets consumed. Counseling motivate based on individual conditions more effective to overcome the side effects and benefits felt after consumed tablets and forgot factor. Both interventions should be implemented to all pregnant women at least once involvement the family, so support is stronger and more adherent to consume iron tablets.

**Keywords:** *support, iron, counseling, pregnant, classes*

## INTRODUCTION

As much 528.7 million women worldwide assumed anemia, as 32,4 million is pregnant women (15-49 years) as 11,5 million at south east asia region.<sup>1</sup> At least half of this anaemia burden is assumed to be due to iron deficiency.<sup>2</sup> Anaemia in pregnancy was a global health problem especially in developing countries and Indonesia among these.<sup>3</sup> The basic health research in Indonesia year 2013, showed that the prevalence of nutritional anemia in pregnant women in Indonesia

is still high (37.1%) and requires serious attention.<sup>4</sup> Anemia is one of the risk factors of maternal mortality, low birth weight as well as risk factors infections of the fetus and mother, abortion, and premature birth.<sup>5</sup>

Model of ante natal care developed by WHO in 2016 which is expected to provide care to pregnant women in a focused, individualized manner, centered on each contact and ensure each contact is given effective and integrated clinical practice (intervention and tests). More over providing relevant and timely information, offering psychosocial and emotional support by practitioners with good clinical and interpersonal skills worked in a well functioning health system. It turned out that the evidence shows that perinatal mortality increased if only with four ante natal care visits. WHO recommends a minimum of eight contacts, five contacts in the third trimester, one first trimester contact, and two second

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trimester contacts. WHO assumes that each country will adjust this new model in its ante natal service package and determine what care is given to each contact, who and where it is given.<sup>5</sup> Pregnant women should be more frequently checked if they have problems, feel any signs of danger or worried. Pregnant women should get complete pregnancy services according to the standard.

As much 49 % pregnant women worldwide and 45 % at south east asia region who had anemia is amendable to iron supplementation. Anaemia is defined as blood haemoglobin concentration < 110 g/L for children and pregnant women.<sup>1</sup> A pregnant woman is called anemia when hemoglobin concentration is lower than 110 g/L, in the second trimester of pregnancy hemoglobin concentration usually decreases about 5 g/L. When anemia is accompanied by an indication of iron deficiency (low ferritin levels), it refers to as iron deficiency anemia. Low hemoglobin concentration indicates moderate or severe anemia which is at risk of preterm labor, maternal and child mortality, infectious diseases. Iron deficiency anemia can affect growth and development during the uterus and in the long run. Hemoglobin concentration of greater than 130 g/L also can be associated with negative pregnancy outcomes such as premature delivery and low birth weight.<sup>6</sup>

Given that it is estimated that at least half of anaemia cases will have causes other than iron deficiency, current strategies to control anaemia may need to be re-evaluated to ensure that the various factors contributing to anaemia have been identified and addressed properly in an integrated manner. In malaria endemic regions, malaria control can reduce anaemia and severe anaemia by over a quarter and by 60%, respectively. There is also an increased need for improved water and sanitation and deworming in populations affected by hookworms and schistosomiasis; these populations typically live in rural tropical regions with poor sanitation facilities, especially in areas of Asia and Africa.<sup>1</sup>

Iron deficiency anaemia should ideally be addressed through dietary diversification and improved access to foods that have high levels of bioavailable iron, including animal products. Daily or intermittent iron supplementation, alone or together with folic acid and other micronutrients, can be used for high-risk groups (children, pregnant women and women of reproductive age), to improve iron intakes. However, supplementation programmes need to address challenges that have

limited their effectiveness, such as poor attendance at antenatal clinics, insufficient doses for supplementation, or insufficient emphasis on behavioural aspects of using supplements on a regular basis. Other foodbased approaches, such as fortification of staple foods and condiments, can also be used to improve iron intake in the general population. Fortification of wheat flour with iron and other vitamins and minerals is currently mandated in 80 countries but the extent of coverage varies.<sup>1</sup> During pregnancy, women need to consume iron supplements to make sure they have enough iron to prevent iron deficiency. Therefore, in most low- and middle-income countries, iron supplements are widely used by pregnant women to prevent and improve iron deficiency and anemia during pregnancy. If supplementation starts after the first trimester of pregnancy will not help prevent birth defects. Gastrointestinal distress is a common experience of women who consume large amounts of additional iron, especially on an empty stomach. So gastrointestinal effects are considered an important side effect for base the intake level in large quantities. The use of high doses of iron supplements is related to constipation and other gastrointestinal effects, including nausea, vomiting and diarrhea, with frequency and severity depending on the amount of iron released in the stomach.<sup>6</sup>

In Indonesia iron tablets can be obtained free of charge at public health center, village health post, integrated service post and purchased in pharmacies. Iron tablets must be taken for 90 consecutive days without interruption during pregnancy.<sup>7</sup> Compliance of iron tablet consumption is the behavior in consuming iron tablets according to the rules both in amount consumed and how to consume properly. The supply of iron (Fe) tablet of 90 for each pregnant mother became the primary strategy to reduce the prevalence of anemia since the 1980s. The provision of iron tablets is not yet effective because of the lack of coverage of iron tablets as well as low maternal compliance in consuming iron tablets. Compliance one important factor that determines the success of giving full iron tablets, next contributes to the success of prevention and treatment of anemia in pregnancy. The results showed that majority of participants had a low compliance of iron tablet consumption as 33.7%.<sup>8</sup> Iron supplementation coverage was 88.77%, however, the prevalence of anemia was high (21.88%).<sup>9</sup> Routine daily iron supplementation during pregnancy resulted in a significant reduction of 20% in incidence of low birthweight in the intervention group compared with control.<sup>10</sup>



Adherence to consumption of iron tablets is still very low, which is largely due to low knowledge of iron tablets, have negative attitude so that poor practices thus requiring health education.<sup>11</sup> Another study indicated the lack of knowledge regarding iron rich foods and the importance of iron supplementation during pregnancy. Educating antenatal women about importance of consumption of iron tablets and implementing this into practice will help for prevention of anaemia.<sup>12</sup> Efforts to remind mothers to consume iron tablets among others done with mobil phone.<sup>8</sup> Another effort is health education through maternal classes and counseling by the midwife, this has become a recommended activity carried out at the public health center by the Indonesian health ministry. Pregnant women need more attention from their spouse or family.<sup>13</sup>

More of pregnant women did not get support from their family/husband to consume iron tablets. The type of social support can be in the form of emotional support, instrumental support, information support and appraisal support. Social support is the feedback provided through contact with the same and valued colleagues. Forms of the emotional support are influence, self-esteem, and attention; the instrumental supports are manpower, money, time; the information supports are suggestions and information; the appraisal supports are input and affirmation.<sup>14</sup>

During pregnancy the mother needs significant support from the husband, should be prepared to give extra attention during pregnant, should remind and motivate the wife to consume nutrients. The role and support of husbands in the improvement of family health includes efforts to raise attention to health problems and is the greatest challenge aimed at helping families learn how to be healthy.<sup>15</sup> Suggested the need to conduct education and training to build the knowledge and experience of pregnant women about the nutritional status and health behavior was good with involving the active participation of health workers, community, family, mother and husband.<sup>16</sup> Pregnant mother class and midwife counseling give influence to pregnant mother and his family. Families are expected to participate in such efforts at least once.

Based on the above description, the researcher examines how the difference of family support for pregnant women to check pregnancy and consumed iron tablets and the amount of iron tablets consumed by

pregnant mother after pregnant women and their family follow pregnant mother class and midwife counseling?

## **METHOD**

The research design is quasi experiment post test only with primary data source from pregnant mother. The population were all pregnant women in Sukasari community health center who have received first prenatal care and 30 iron tablets for a month, regardless of gestational age and anemia status. Sampling in this research using non probability sampling that is by purposive sampling. The number of samples is 30 pregnant women for pregnant class group and 30 for midwife counseling group.

There are two groups of intervention, the group that joined the pregnant mother's class and the group of pregnant women join the midwife counseling. In each group include family on one of its activities. Appropriate research design data collection is done a month after pregnant mother and midwife counseling, that is the time of pregnancy checked. Univariate analysis includes frequency distribution, test result of normality of distribution to all group of data obtained that data not normally distributed, then bivariate test to test the difference using non parametric statistic.

Pregnant women class is a group studying with maximum participants 10 people. In this class, they're will learn together, discuss and exchange experiences about maternal child health thoroughly and systematically and can be carried out on a scheduled and ongoing basis.<sup>19</sup> Pregnant women class is facilitated by midwives / health workers by using the pregnant women class package includes maternal child health books, flip charts, pregnancy class guidelines, pregnant women facilitator's handbook and pregnant women's gymnastics book. The pregnant women class must be attended at least four meetings, preferably one meeting with husband or family. Pregnant women class participants should be 20 to 32 weeks of pregnancy, because at this strong condition, not afraid abortion occurs, effective to do gymnastics pregnant. The husband / family participates at least one meeting, they can follow important material, such as childbirth preparation or other materials.

Counseling during prenatal care includes about pregnancy care, prevention of congenital abnormalities, early initiation of breastfeeding, puerperium care,

newborn care, exclusive breastfeeding, family planning, immunization in infants; given in stages at each visit. Counseling is a two-way communication process, involving both the giver and the recipient of the message, occurs verbally and non-verbally, process to help others to be able to make choices and solve their own problems. Interpersonal communication skills of health workers affect the changing behavior of clients. Counseling steps are G - A - T - H - E - R stand for Great, Respectfully, Asses needs, Tell information, Help choose, Explain and demonstrate, Refer or return visit.

### RESULTS AND DISCUSSIONS

Implementation of pregnant women class is done by involving families aimed at improve compliance of iron tablet consumption during pregnancy. Observation using a checklist of pregnant women class activities shows all the steps taken. Implementation of the midwife counseling is done by involving the family in at improve compliance of iron tablet consumption during pregnancy. Observation by using a checklist of pregnant midwife counseling activities indicates all the steps taken.

The following table about support family to pregnant women to check pregnancy post- pregnant women class and midwife counseling. Just a number of 56.70% of pregnant women get family support for pregnancy check in the high category, the percentage of the category is the same in two groups.

**Table 1: The support family to pregnant women to check pregnancy post- pregnant women class and midwife counseling (n = 30 each group)**

Statistical measures	Support family to check pregnancy		
	Group 1*	Group 2*	Total
Mean	38,73	41,17	39,95
Median	40,00	42,50	40,00
Minimal	21,00	35,00	21,00
Maksimal	45,00	45,00	45,00
Shafiro Wilk Test	0,000	0,000	0,007
Low Category	13,00 (43,30%)	13,00 (43,30%)	26,00 (43,30%)
High Category	17,00 (56,70%)	17,00 (56,70%)	34,00 (56,70%)

\* Group 1 = pregnant women class

\*\* Group 2 = midwives counseling group

The results above have not shown the success of pregnant women classes and midwife counseling to increase support from most families. It is hoped that the support of the whole family to pregnant women to check their pregnancy, the support is expected after the family get information about pregnancy care through its participation in pregnant women class and counseling. This expectation appears refer to the results of research that there is influence of pregnant class to pregnancy care significantly. Through the pregnant women class is expected to do maternal care well for the realization of optimal maternal and infant health. The optimal of family support through interventions needs further study, possibly because their participation only once or perhaps the implementation of intervention has not been optimal. It is worth reviewing even further research for how to increase family support for pregnant women to check their pregnancies.

**Table 2: The support family to pregnant women to consume iron tablets post- pregnant women class and midwife counseling (n = 30 each group)**

Statistical measures	Support family to consume iron tablets		
	Group 1	Group 2	Total
Mean	25,13	26,97	26,05
Median	25,00	27,00	25,00
Minimal	15,00	23,00	15,00
Maksimal	30,00	30,00	30,00
Shafiro Wilk Test	0,055	0,000	0,000
Low Category	11,00 (36,70%)	11,00 (36,70%)	22,00 (36,70%)
High Category	19,00 (63,30 %)	19,00 (63,30 %)	38,00 (63,30 %)

Just a number of 63.30% of pregnant women received family support to consume iron tablets in the high category, the percentage of the category is the same in two groups. Intervention was not encouraging all or most families to provide support to pregnant women to consume iron tablets. Intervention is based on research that there is a significant relationship between the support of family with the level of compliance pregnant women consume iron tablets. Efforts to increase family support are expected to improve maternal compliance of taking iron tablets so that the coverage of iron tablets increases and anemia of pregnant women is decreased. The lack of optimal family support through interventions needs

further study, possibly because of their participation only once or perhaps the implementation of the intervention has not been optimal. Need to examine even further research for how to increase family support to pregnant women to consume iron tablets. The following table about the amount of iron tablets consumed.

**Table 3: The amount of iron tablets consumed by pregnant women post pregnant women class and midwife counseling (n = 30 each group)**

Statistical measures	Group 1	Group 2	Total
Mean	28,87	29,83	29,35
Median	30	30	30
Minimal	21	27	27
Maksimal	30	30	30
Consumed 30 iron tablets	18 (60 %)	28 (93,3 %)	46 (76,67 %)
Shapiro Wilk Test	0,000	0,000	0,000

Percentage of pregnant women who consumed 30 iron tablets for a month, more in the midwife counseling group (93.30%) than in the pregnant women class group (60%). Counseling can encourage almost pregnant women to consume iron tablets daily for a month (indicating high compliance). Counseling is individual communication, while the class of pregnant women is group communication. Individual communication is more intense on individual issues than the class of pregnant women. However in some cases the pregnant women class have the advantage of exchanging experience in solving problems between pregnant women.

Use different test U Mann Whitney, there's no significant difference between pregnant women class group and midwife counseling group in family support to check pregnancy (p 0,080) and support to consume iron tablets (p 0.077). Another result there's significant differences (p 0.003) between two groups in the amount of iron tablets consumed by pregnant women. Based on husband's education, there's no significant different family support for pregnancy check (p 0,143) and no significant different family support to consume iron tablet (p 0,888). Based on husband's occupation, there's no significant different family support for pregnancy check (p 0,357) and no significant different family support to consume iron tablet (p 0,977).

The results showed no significant difference between pregnant women class and midwife counseling group in family support to pregnant mother to check pregnancy and support to consume iron tablet. Mother and her family get information and exchange information about pregnancy, childbirth, childbirth and newborn care on pregnant women class. The class of pregnant women should be attended by at least four meetings, preferably at least one meeting attended with husband or family. Social support is still needed and must be pursued through other efforts to be suggestions for further researchers and a challenge for health workers in the field. This is in line with other research that suggests strategies such as social support from families, stronger community-based counseling, and increased health care provider and community awareness of preeclampsia are critical for women to understand the benefits of supplementation and resolve confusion caused by current descriptors used for anemia and hypertension.<sup>17</sup>

The results that have not been optimal are likely due to the lack of optimal implementation of activities by the officers, although in this study observation sheets have been used to monitor the implementation of classes for pregnant women and counseling by midwives and the results are good. Pregnant women class material is pursued in accordance pregnant women class guidelines that contain pregnancy care, childbirth, postnatal care, newborn care, myths, sexually transmitted diseases and birth certificates. But do not rule out any other material according to the needs of pregnant women who become participants. The material or message that will be delivered to the target class of pregnant women and midwife counseling should be tailored to the health needs of individuals, families, communities so that the material can be perceived directly benefited. To facilitate understanding and attract the attention of the target material should be delivered using a language that is easily understood by the target.

The possibility of not optimal implementation by officers can be explained by the results of other studies of health care providers. The result showed most of the health care providers were able to recognize three signs of anaemia, taken to test for anaemia or the underlying causes almost everyone measuring of the haemoglobin concentration, almost half measuring the serum ferritin and fraction stool tests for parasites. Almost everyone mentioned the lack of laboratories, the lack of education materials as the barrier to diagnosing

anaemia and controlling parasites. There are gaps in the clinical records in the health centres. Recommended to strengthen the counselling capacities on a healthy providers, prevention and treatment of anaemia, and use of growth charts. More other develop and include indicators of activities on the education.<sup>18</sup>

This research then shows the results, as a significant difference between pregnant women class and midwife counseling groups in the amount of iron tablets consumed by pregnant women. This difference is thought to be due to more instantiated knowledge changes in the midwife counseling group. Consumption of iron tablets as 30 tablets in the counseling group showed that compliance of post-counseling iron tablet consumption was higher than adherence in pregnant women class. Good counseling is necessary encourage mothers to abide by consuming iron tablets, also encourage mothers to adhere consumption of iron tablets. The advice from the midwife to consume iron tablets as well as the information submitted by the midwife that the tablet will be beneficial to the mother's health.

Other studies showed many factors related to pregnant women compliance iron tablets, such as religion, level of education of women and their husbands and socioeconomic status were found to be significantly associated with the prevalence of anemia in pregnancy. Low socioeconomic class, illiteracy, Hindu religion were significantly associated with high prevalence of anemia during pregnancy in Indian women.<sup>19</sup> Residence, educational status, iron supplementation during pregnancy, and meal frequency per day were statistically associated with anemia among the pregnant women. Awareness creation and nutrition education on the importance of taking iron supplementation and nutritional counseling on consumption of extra meal and iron-rich foods during pregnancy are recommended to prevent anemia in the pregnant women.<sup>20</sup>

Another advantage if pregnant women was not anemia, other studies have been found diagnosis and treatment of physiologic factors, especially anaemia, would reduce the risk of postpartum depression.<sup>21</sup> Involvement of husbands and other family members during pregnancy and birth should also be encouraged and re-inforced by health promotion programmes. Community and religious leaders should be engaged to support key messages.<sup>22</sup>

The message and clear directions from the health workers on mothers indicating a good awareness from mothers. However, mothers did not know the need to consume iron tablets on a continuous basis and start taking them early in pregnancy. Monitoring and counseling provided by community officials (in Indonesia is a cadre) is considered one of the key successes of this program. Through counseling there is a two-way communication, midwives are expected to counsel properly so as to encourage changes in the behavior of message recipients, including maternal compliance in consuming iron tablets can be achieved.

Another thing to consider in tackling anemia in pregnant women is to intervene to teenage girls long before they get pregnant. Several studies have found low knowledge about anemia and foods that should be eaten to prevent anemia, a neutral and even negative attitude towards preventing anemia. This data directs the need for health education for young women about prevention of anemia through various methods and on various occasions.<sup>23,24,25</sup> It is necessary to advocate for policy makers in the health department and at the public health center to develop more intensive reproductive health activities for girls in school. This health education will be an investment for the creation of pregnant women who do not suffer from anemia in the next decade. Prevention and improvement efforts must begin to be intensified and not only dwell on controlling problems now.

## CONCLUSIONS

The research conclusion is no difference in family support for pregnant women to checking pregnancy and consumed iron tablets, but is a significant difference in the number of iron tablets consumed after pregnant women classes and midwife counseling. Recommended that pregnant women classes and midwife counseling be implemented to all pregnant women, at least one time involvement the family, if possible more often so the support is stronger. Further research is suggested to develop a model of pregnant women class that can encourage pregnant women to consuming iron tablets completely, by paying attention to packaging material according to the conditions and needs of the audience.

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# Effective Communication Methods for Increase Mothers Intention to Inspection Visual Acetic Acid Test

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## ABSTRACT

Cervical cancer affects many women and deadly after breast cancer. The mortality rate is high, 70% patients come in advanced stage, one reason is early detection low coverage including VIA test. Research aims determined effective interventions to improve women intentions perform VIA test. Mixed methods explorative sequential conducted, first qualitative explorations to know factors related VIA test intention as basis message formulation. Next, quasi experimental two groups pre-post tests. The population is women 30-50 years, purposive sampling determined 30 women each group. Indepth interviews conducted eight informants, suggest IEC individuals through home visits with counseling supporting leaflets and IEC Groups through group discussions supporting video and stick posters in strategic places. The messages are VIA test definition, procedure with emphasis isn't painful, short times, quickly known results, fees and place services. who should tested, family supports. The results similar between group, 100% women in the weak intentions categories before intervention and switch to strong intentions categories after intervention. T test result showed significant difference of intention (p 0,000) before and after intervention in both groups and there's no significant difference in intention change (p 0,859) between two groups. The IEC individual as good as IEC Group method, the combination of techniques and media can improve the expected changes. No significant different (p>0,05) intention change based on education, occupation, married age, number of children. Interventions expected to continue so that stronger intention become to real behavior and expanded to other areas.

**Keywords:** IVA, intention, information education communication, counseling, group discussion.

## INTRODUCTION

Cervical cancer is the second most common type of cancer in women worldwide. Almost 80% of cases occur in developing countries,<sup>1</sup> the prevalence of cancer in Indonesia 1.4 per 1000 population.<sup>2</sup> Chronic human papilloma virus (HPVs) infection is strongly associated with the development of cervical cancer. The screening for HPVs in the general population is urgently needed as a means of early detection of cervical cancer. In developed countries, incidence and mortality rates have decreased, which attributed largely to early detection. With screening and early detection, the progression of

precancerous cervical lesions can be completely avoided in most cases. In early stages, the cancer cervix is highly treatable.<sup>1</sup>

Visual inspection of the cervix with acetic acid (VIA) is very sensitive for ectocervical lesions. The advantages of the VIA method are low cost, ease of use (can by paramedical), high sensitivity and immediate results. Its main limitation is a high rate of false-positive results, which may lead to over treatment if a "see and treat" policy is applied.<sup>3</sup> Screening for precancerous and cancerous cervical lesions using VIA is a simple, low-cost, and efficient alternative to cytologic testing in low-resource areas.<sup>4</sup> The VIA benefit would facilitate development of screening, diagnosis, treatment of cervical neoplasia and improve awareness of cervical cancer prevention.<sup>5</sup>

Early detection of cervical cancer needs a mechanism to establish and strengthen the multi-sectoral response in general for the prevention and control of cervical cancer

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and increasing awareness of the community towards cervical cancer screening and strengthening the health system in particular.<sup>6</sup>

Using planned behavior theory, try to find out which mothers are at what level in the planning stage of carrying out VIA tests. How far is the mother's intention to do VIA test and the factors associated with the problem. The results used as basis formulating messages and methods. The planned behavior theory that essentially behavioral beliefs as produce likes or dislikes, normative beliefs that generate awareness of the pressure of the social environment or subjective norms, control beliefs as beliefs about the existence of factors that can support or hinder the behavior and awareness of the strength of these factors.<sup>7</sup>

The underlying problem is the low coverage of VIA tests, the research problem is what is the more effective communication intervention to improve women's intentions of performing VIA tests. While the purpose of the study to determine the effective intervention in improving the intention of women performing VIA tests.

## METHOD

Mixed methods research design<sup>8</sup> is qualitative in order an assessment women intention to VIA test which will base the intervention formulation, and quantitative with experimental quasi two group pre-posttest design to see effectiveness of each intervention. The study conducted in Puter Bandung City on April - June 2017.

Qualitative data collection with in-depth interview to three informants had VIA test, three informants hadn't VIA test, one cadre, one midwife holded VIA test program. Interviews conducted at public health center and informant house. Analysis by arranging transcripts, reading the whole to build a general sense of information and reflect the overall meaning, detailed analysis by coding data, describing categories, themes, interpreting.

The population for quantitative method are women of childbearing age (30-50 years), with samples as formula 30 people each groups selected purposive sampling. The're intervention group (Group 1) and comparison group (Group 2) that received different IEC intervention.

The intervention group filled pre test, after that done intervention 1, one week later filled post test.

The comparison group filled pre test, then conducted intervention 2, one week later filled out post test. Pre-post test developed in structured interview arranged by innovation diffusion theory.

## RESULTS AND DISCUSSIONS

**Qualitative Research Results:** All informants more know pap smear than VIA test. Unclear information about who at risk, procedures, VIA test cost, place of services, not yet known sure VIA test at local health center. Need clear information about VIA test. Rarely got health information from health workers directly. Direct education and counseling with the media became the choice in obtaining health information.

Informants who hadn't VIA test, they want to do VIA test but didn't know where, not known VIA test. The husband support to do VIA test not yet maximal, they hadn't expose clearly about VIA test so they submit decisions to the wife. Informants had VIA test, stated the VIA test isn't frightening as it was heard before, doesn't take long and fast results. The husband in favor of the decision to do the VIA test could be because the wife explained so the husband understand and support. The findings indicate that the behavior control arises from herself, the informant feels the importance of VIA test because it will be known how the health condition. Free cost is also the reason for the informant to perform tests, as well as friend invitation to perform the test.

All informants know cervical cancer that attacks the dangerous uterus, can be contagious. In part informants didn't know the risks and vulnerabilities of cervical cancer. All informants know the benefits VIA test to knowing the health condition as early as possible, if necessary the treatment can be done as soon as possible. Direct education and counseling with the media became the community's choice in obtaining health information.

**Development of Intervention:** Based on above analysis, interventions developed with the individual and group IEC. Individual IEC through home visit with counseling method and supporting with media leaflets. Group IEC through group discussion method, supporting video and stick posters in strategic places. The messages are VIA test definition, procedure with emphasis isn't painful, short times, quickly known results, fees and place services. who should tested, family supports.



**Quantitative Research Results**

**Table 1: VIA Test Intentions Before and After Interventions**

Intervention	Mean	Median	P value	Intention Category**	
				Weak	Strong
<b>Indiv. IEC</b>					
Before	44,97	45,61	0,518	77%	23%
After	77,89	78,07	0,167	0	100%
<b>Group IEC</b>					
Before	43,04	42,54	0,485	90%	10%
After	76,26	76,32	0,440	0	100%

\* Shafiro wilk test

\*\* Categories use cut of point 50 as the ideal average

That increased 32.92 score of intention after individual IEC also rose by 24.22 after group IEC, with cut of point 50, there's 100% women in weak category before intervention switch to strong category after intervention, the same in both groups.

**Table 2: Different Test of Intention Between Two Groups**

Variables	Type of intervention	Mean	t	p value
Intention Before	Individual IEC	44,97	1,415	0,163
	Group IEC	43,04		
Intention After	Individual IEC	77,89	1,769	0,083
	Group IEC	76,26		
Change of intention	Individual IEC	32,92	-0,172	0,859
	Group IEC	33,21		

**Note:** Intention different individual IEC before and after p 0,000

Intention different Group IEC before and after p 0,000

There're significant differences (p 0,000) of VIA test intentions before and after intervention in two groups. There's no significant difference (p 0,163) intentions between two groups at baseline, no significant difference (p 0.083) intention after intervention also no significant difference (p 0.859) intention change between two groups. Intention is the closest step to the occurrence of real behavior, which first arises knowledge, attitudes related to the expected behavior appear. The occurrence of intention changes is an indication that IEC, which is

carried out individually or in groups, can be used as an alternative method to encourage mothers to do VIA test.

Previous studies about VIA test showed 81.8 % lacking knowledge related to HPVs and cervical cancer including its nature, types, symptoms, transition mode, diagnosis, vaccination and possible complications. HPVs education program appropriate for different age groups and cultures represented an essential demand to upgrade women's knowledge and attitude towards HPV. Stressing nursing role in early detection of cervical cancer is a must in the gynecological outpatient's clinics.<sup>9</sup>

Another study showed a high percent of women knew that it is appropriate for all women to get cervical cancer screening, but only a small proportion of women actually got screening. There may be an opportunity to design educational materials for this population that will not only encourage participation in cervical cancer screening but also remediate misconceptions.<sup>10</sup> This research tries to answer these suggestions where two approaches are developed, as individuals and groups with different media. Apparently both showed a change in intent to conduct a VIA test.

The increase in respondent's intentions was due to repeated intervention by home visits after the intervention, there's intended to strengthen the knowledge and understanding of respondents to the message delivered. Continual intervention is needed to make that intention more strong and become a real behavior. Rogers defines the diffusion of innovation as a process of disseminating the uptake of new ideas or things in an attempt to transform a society that occurs continuously from one place to another place, from time to time, from one field to another fields to a group of members of the social system. The main goal of innovation diffusion is the adoption of an innovation by society and other social milieu.<sup>7</sup>

The diffusion stage of innovation consists of five stages as knowledge, persuasion, decision, implementation and confirmation. If the stages of the innovation diffusion theory are well passed by the women, she will perform the VIA test periodically. Individuals are convinced that this VIA test is very important and useful for the women health. When the individual has a very strong intention, in the near future he will perform the behavior. Conversely, when the individual has weak intentions takes a long time to behavior individual behaves.<sup>7</sup>

The both interventions are equally effective in increasing intentions, the interventions provided are highly capable of increasing the intentions of all women. The research results can be the basis for public health center in providing health information to the community. With frequent direct counseling, it's hoped that the women will be more aware with health and will automatically improve the community health status. In terms of efficiency, both time, energy, material, the group IEC most efficient intervention. The Group IEC only do one time, whereas Individual IEC must do more times to make home visits. Respondents' houses are scattered throughout the area so it takes a lot of time and effort.

In making efforts to increase the coverage of VIA test needs to pay attention to the factors related to the practice of the mother carrying out the VIA test. Below this results of this study are test different of changes in intention based on the characteristics of respondents.

The test showed characteristics of respondents in both groups are equal (chi square test  $p > 0.05$ ) includes mother's age ( $p 0,267$ ), education ( $p 0,567$ ), occupation ( $p 0,458$ ), marriage age ( $p 0,513$ ), number of children ( $p=1$ ). Different test results in VIA test intention change based on respondent's characteristic is no significantly differences ( $p > 0,05$ ). It's interpreted, no contribution characteristic of respondent to increase of intention.

**Table 3: Different of Intention Change Based on Respondent's Characteristic**

No.	Characteristic	p value	Type of Test
1.	Mother's age	0,449	Independent T test
2.	Education	0,542	Independent T test
3.	Work	0,858	One Way Anova test
4.	Age married	0,617	One Way Anova test
5.	Children Number	0,929	One Way Anova test

The previous study showed the experiences include developing community partnerships to listen and learn from the community, thereby enhancing appropriateness of services; developing culturally appropriate messages and educational materials; making access to high-quality screening services easier; and identifying effective ways to encourage women and their partners to complete diagnosis and treatment regimens. Cervical cancer prevention programs that use these strategies are more likely to increase demand, ensure follow-through for treatment, and ultimately reduce disease burden.<sup>11</sup>

Hopefully the IEC efforts increased coverage of VIA tests so that they can contribute to a decrease in the incidence and death of women due to cervical cancer. However, so that mothers can do VIA tests need to be supported by the availability and affordability of mothers for VIA test services. This concerns the policy of local health services as well as increasing the number and quality of health workers who provide VIA test services. Strong advocacy is needed for policy makers to expand the reach of health education about VIA tests for mothers with the support of relevant cross-sector policy makers. Previous studies suggest experience demonstrates the role that evidence-based advocacy efforts play in the ultimate success of cervical cancer prevention programs, particularly when new screening and treatment approaches.<sup>12</sup>

### CONCLUSIONS

Interventions developed based on qualitative analyzes are individual IEC with counseling at home visits supported leaflets and group IEC with group discussion supported video and stick a poster at strategic points. There's significant differences ( $p 0,000$ ) of intention to perform VIA tests before and after individual also group IEC. There's no significant difference ( $p 0.859$ ) VIA test intention change between individual and Group IEC. There's no significant difference ( $p > 0,05$ ) change of intention based on mother's age, education, occupation, married age and number of children, that's mean respondent characteristic didn't contribute to increase intention. Both interventions are equally effective and able to improve women intention from weak to strong category. Individual and Group IEC should be followed up with home visits to strengthen knowledge and strong intentions to turn into concrete behaviors. The media (leaflets, posters, videos) can be used to strengthen the IEC activities undertaken. It's hoped the research to see the impact of Individual IEC and Group IEC by looking at the increased coverage of the VIA test program.

**Conflict of Interest:** There is no conflict of interest.

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# Depression Associated with Quality of Life in People with Paraplegia

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## ABSTRACT

**Introduction:** Spinal cord injury significantly affects one physically and psychologically, especially in self-acceptance. Problems with self-acceptance can lead people with spinal cord injury to depression. Depression is a significant factor influencing the quality of life of people with spinal cord injury.

**Method:** This study was a descriptive analytic research with cross-sectional design. Data was collected from people with paraplegia interviewed using questionnaires. The sampling technique was random cluster sampling with the formula of limited proportion. Beck Depression Inventory (BDI) was used to assess depression and World Health Organization BREF (WHOQOL-BREF) to assess quality of life. The data were then analyzed using SPSS.

**Results:** A total of 30 respondents with paraplegia aged 25 – 65 years participated in this study. Statistical analysis showed a significant correlation between depression and quality of life in the 4 domains of WHOQOL-BREF: physical health ( $r=-0.621$ ,  $p<0.001$ ), psychological ( $r=-0.608$ ,  $p<0.001$ ), social ( $r=-0.440$ ,  $p=0.015$ ), and environment ( $r=-0.574$ ,  $p=0.001$ ). People with paraplegia who had higher depression tended to have poorer quality of life

**Conclusions:** There is an association between depression and quality of life in people with paraplegia.

**Keywords:** *Depression, Quality of life, Disability, Spinal Cord Injury*

## INTRODUCTION

According to the World Health Organization (WHO) disability covers impairment, activity and participation limitation<sup>1</sup>. Based on Indonesian National Social and Economic Survey, the prevalence of disability in Indonesia in 2012 was 2.45% of the total population<sup>2</sup>.

WHO classifies disability into several categories, one of them is disturbance of foot use<sup>3</sup>. Disability disruption of foot or leg use can be caused by damage to the spinal cord resulting in temporary or permanent changes in

motor, sensory, and normal autonomic functions. Spinal cord injury can cause weakness of lower limbs referred to as paraparesis<sup>4</sup>.

The Department of Health of Yogyakarta Special Province recorded 19,511 people suffered disability, including those becoming paraplegic due to Java earthquake in 2006 and Mt.Merapi eruption in 2010<sup>5</sup>. Paraplegia affects psychological condition and may reduce quality of life<sup>6</sup>. In this research the problem to be discussed is to find out if there is a correlation between depression and quality of life in people with paraplegia.

Previous several research have studied about the correlation between depression and quality of life. Shin et al (2012) studied about depression and quality of life in patients within the first 6 months after the spinal cord injury<sup>7</sup>. A total of 36 respondents with SCI within 6 months were asked to fill out questionnaires concerning Beck Depression Inventory (BDI), World Health Organization Quality of Life Questionnaire-BREF, Stress Response Inventory, and Connor-Davidson

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resilience scale. The result in this research were the patients within six months after SCI injury had higher rate of depression and higher overall level of depression. Also, patients with motor complete injury had affected significantly on depression, QOL and stress<sup>7</sup>.

Ataog lu, et al (2013) studied about effects of chronic pain on quality of life and depression in patients with spinal cord injury<sup>8</sup>. A total of 140 patients (104M, 36F) with SCI who underwent inpatient rehabilitation treatment were examined. A questionnaire including clinical variables was applied. Motor score of Functional Independence Measure was used to assess daily- life activities, the 36-Item Medical Outcomes Short-Form Health (SF-36) for QoL and Beck Depression Inventory (BDI) for depression. Patients were then divided into those having chronic pain (Group I) and those without any pain (Group II), and groups were compared according to demographic and clinical variables. The result in this research SCI patients with chronic pain had higher depression ratings and their BDI scores were correlated with some of the SF-36 domains (general health, vitality, social functioning and mental health)<sup>8</sup>.

To the knowledge of this study researchers there has been no research related to the association between depression and quality of life to people with paraplegia in Indonesia.

**METHOD**

This cross-sectional study was conducted in Bantul, Kulonprogo and Gunungkidul districts using primary data with the Beck Depression Inventory (BDI), WHOQOL – BREF, Activity of Daily Living (ADL) questionnaire, and Instrumental Activity of Daily Living (IADL) in November 2017. Only results of BDI and WHO\_QOL BREF were presented in this paper. This research was conducted in cooperation with Pusat Rehabilitasi YAKKUM (YAKKUM Rehabilitation Center). The respondents consisted of 30 persons with paraplegia who were clients of PRY. The sampling technique of this research was consecutive sampling with inclusion criteria of persons with paraplegia aged 18 - 64 years, and exclusion criteria of persons with communication problems such as deafness and severe psychiatric disorders that could not cooperate during data collection. Data obtained was processed in Clinical Epidemiology and Biostatistics Unit Faculty of Medicine, Gadjah Mada University Yogyakarta using Pearson correlation test to find out the correlation between depression and quality of life.

**RESULTS AND DISCUSSIONS**

A total of 30 respondents with paraplegia participated in this study. Eleven of them were men and the rest were women. The mean age was 44.77 years. Twenty-five of them (83.33%) had incomplete paraplegia and 5 of them (16.67%) had complete paraplegia. Twenty-two respondents (73.33%) were married, 2 (6.67%) were divorced, and 6 (20%) were single. The data were presented in Table 1.

**Table 1: Characteristic of respondents (n = 30)**

Variable	f	%
<b>Sex</b>		
Female	19	63.33
Male	11	36.67
<b>Age</b>		
25–35	7	23.33
36–45	8	26.67
46–55	10	33.33
56–65	5	16.67
<b>Severity of Injury</b>		
Incomplete	25	83.33
Complete	5	16.67
<b>Marital Status</b>		
Married	22	73.33
Divorced	2	6.67
Single	6	20.00

Screening on depression using BDI revealed that 18 respondents (60%) might not have depression, 5 respondents (16,66%) might have mild mood disorder, 3 respondents (10%) have clinical depression, 2 respondents (6,67%) have moderate depression, and 2 respondents (6,67%) were classified as having severe depression. Table 2 presented these results.

**Table 2: Beck Depression Inventory (BDI)**

Level depression	N (30)	Percent (%)
Reasonable	18	60
Mild mood disorder	5	16,66
Clinical depression	3	10
Moderate depression	2	6,67
Severe depression	2	6,67
Extreme depression	0	0
Total	30	100

The quality of life of the respondents assessed using WHOQOL-BREF was shown in Table 3. Among 30 respondents 22 respondents (73,33%) had good quality of life in physical domain and environmental domains, while 8 respondents (26,6%) had poor quality of life in those domains. In psychological domain there were 24 respondents (80%) who had good quality of life and 6 respondents (20%) did not. Meanwhile in social domain 20 respondents (66,67%) had good quality of life and 10 respondents (33,33%) had poor quality of life.

**Table 3: WHO QOL-BREF**

WHOQOL-BREF		N	Percent (%)
QOL Domain 1 (physical)	Good (≥ 50)	22	73,33
	Poor (< 50)	8	26,6
	Total	30	100
QOL Domain 2 (psychological)	Good (≥ 50)	24	80
	Poor (< 50)	6	20
	Total	30	100

**Table 4: Correlation of Depression (BDI) and Quality of life (WHO QOL-BREF)**

	QOL Domain 1 (physical)	QOL Domain 2 (psychological)	QOL Domain 3 (social)	QOL Domain 4 (environment)
Pearson Correlation	-.621**	-.608**	-.440*	-.574**
Sig. (2-tailed)	.000	.000	.015	.001
N	30	30	30	30

This research studied people with paraplegia, most of them (25 respondents) were 2006 Java earthquake victims. There were more female than male respondents in this study. Hu et al (2012) followed 26 people with spinal cord injuries due to an earthquake in China, there were 15 women and 11 men<sup>9</sup>. Earthquake caused houses to collapse that afflicted the respondents. It was mostly experienced by female respondents because they were housewives and tended to stay at home and escaped last<sup>9</sup>.

This research was participated by the respondents aged between 25 - 65 with the mean age 44.77 years. Abbudi et al (2017) studied 193 respondents with paraplegia aged 18 - 65 years<sup>10</sup>. Most respondents of this study had incomplete paraplegia. Hu et al (2012) reported most of the respondents in their study had incomplete paraplegia with the level of injured at T<sub>7</sub> - L<sub>2</sub><sup>9</sup>.

As presented in Table 2 more than half respondents (60%) might not have depression. They became paraplegia about 5 - 18 years ago. Most of them had been able to accept their condition, while few of them were

Conted...

QOL Domain 3 (social)	Good (≥ 50)	20	66,67
	Poor (< 50)	10	33,33
	Total	30	100
QOL Domain 4 (environment)	Good (≥ 50)	22	73,33
	Poor (< 50)	8	26,6
	Total	30	100

A statistical analysis of correlation between BDI scores and 4 domains of WHOQOL-BREF revealed that there were significant correlations between depression and quality of life in physical domain (r=-0.621, p<0.001), psychological domain (r=-0.608, p<0.001), social domain (r=-0.440, p=0.015), and environmental domain (r=-0.574, p=0.001). The results of statistical analysis were presented in Table 4.

still in the process. Several factors have affected like social supports and physical health. Respondents with complete paraplegia mostly have severe of depression level than incomplete paraplegia. As well as respondents with lack of social support. Almeida et al (2013) reported most individuals with spinal cord injuries and pressure ulcers had depression, and their main symptoms included body image issues, self-deprecation, social withdrawal, and suicidal thoughts<sup>11</sup>.

Table 3 showed that most respondents had good quality of life in physical domain, psychological domain, social domain, and environment domain. This might be related to the fact that they had been through the process of self-acceptance and able to adjust their life to their current condition. However, some respondent still had poor quality of life due to health complication such as decubitus. Dalete et al (2016) reported high prevalence of pressure ulcer in spinal cord injury patient showed a significant dissatisfaction in quality of life especially regarding the physical domain<sup>12</sup>.

Based on statistical analysis of BDI with WHOQOL-BREF, it can be concluded that there is a significant correlation between depression and quality of life in physical, psychological, social and environmental domains. Respondents with higher level of depression tend to have lower quality of life in all domains. This is consistent with the results of the study of Aman, et al (2012) examining the prevalence of psychological problems and quality of life in 50 people with spinal cord injuries in Pakistan<sup>13</sup>. The study reported that the higher the depression scale measured by HADS (Hospital Anxiety and Depression Scale), the lower the quality of life of patients with spinal cord injury as measured by WHOQOL-BREF<sup>13</sup>. Ataoglu, et al (2013) examined the quality of life using SF-36 scores and depression using BDI scores of people with spinal cord injuries who had chronic pain. The study reported that the more severe the physical condition experienced by people with paraplegia such as chronic pain the higher the level of depression. The study also showed a negative pattern of correlation between BDI scores with SF-36 scores of general health, vitality, social functioning, and mental health domains aligned with the results of this study<sup>8</sup>.

The study of Shin, et al (2012) reported people with complete paraplegia who had higher level of depression (BDI) also had poorer quality of life (WHOQOL-BREF) than people with incomplete paraplegia<sup>7</sup>. The study suggested that poor quality of physical health can affect mental health as well. In anticipation of these conditions people who suffer from spinal cord injuries need to go through the stage of self acceptance and adjustment. Most of the respondents of this study had gone through the stage of self-acceptance and adjustment because the injury took place more than 5 years before the data collection, but some were still experiencing difficulties due to health problems such as urinary tract infections and decubitus. According to Dezarnaulds & Ilchef (2014), someone who experiences spinal cord injury has the character and how to accept themselves differently, the time required can be short or long<sup>14</sup>.

Several studies suggested psychological dimensions such as personality, behavior, and perception have a role in how people accept themselves with spinal cord injury<sup>14</sup>. Loss of interest/passion, guilt, loneliness, suicidal intent and feeling helpless are some examples of depressive symptoms that spinal cord injury sufferers often suffer. If rapid depression symptoms are addressed the prognosis

will be better. In addressing the psychological problems of spinal cord injury sufferers it is important to know that there are other factors that may affect the adjustment stage, namely chronic pain, health complications (decubitus, urinary tract infection, etc.) and long-term drug use. Some external factors such as family support and social environment, as well as socioeconomic and financial status can also affect the process of acceptance and adjustment of spinal cord injury sufferers<sup>14</sup>. In this study the respondents had overcome most factors and reached self-acceptance and adjustment with the support of family and social environment. In Bantul District, there were quite a lot of people with paraplegia due to the earthquake, so there were Disabled People Organizations formed for people with disability to gain peer support and self-advocacy. In Kulonprogo District 2 respondents had supportive families while 1 respondent lacked attention from the family. The differences between these two groups were evident from BDI scores and physical health. Respondents who received family support showed good BDI scores as well as no complications such as decubitus. While respondents who received less family attention showed a poor BDI score and had severe decubitus. In Gunungkidul District, 1 respondent had gained self-acceptance and adjustment while 1 respondent had not. The respondent in Gunungkidul District who had self-acceptance and adjustment was active in disability organizations while the one who had not, was more isolated inside the house. According to Skevington, Lofty and O'Connell (2004) depression keeps people away from the community because someone who is depressed is more melancholy and loves to be alone so the more severe the depression becomes, the further the person is from his social activities<sup>15</sup>.

## CONCLUSIONS

There is a relationship between depression and quality of life in people with paraplegia. Depression reduces the quality of life of people who are paralyzed because of spinal cord injuries.

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# Pie Formula Biscuit Flour and Soy Protein Isolate as Alternative of High Protein Snack for Toddler

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## ABSTRACT

Stunting is the impaired growth and development that children experience from poor nutrition, repeated infection, and inadequate psychosocial stimulation. Food program for stunting that have been given by government is complementary biscuit. The low acceptance of biscuit is caused by lack of innovation in delivery to children. This study was conducted to improve the acceptance of the complementary biscuit by adjusting the biscuit flour into a pie with fla that has different flavor and more appealing to the children. This research used an experimental study with a complete randomized design of 4 levels. Substitution of complementary biscuit flour given 0, 5, 10 and 15% while protein isolate 0, 9, 11, and 13%. 30 Panelists evaluated samples on acceptability of colour, appearance, texture and taste using a five point hedonic. The selected formula according to the test is a pie with a substitution of 10% complementary biscuit flour and 11% soy protein. The nutritional content analysis showed that the substitution of complementary biscuit flour and isolate protein were significantly different for the protein and fat content. Preferred test results of selected formula biscuits have the best color, aroma and texture in addition to other formulas. Pie with the addition of biscuit flour and soy protein could be an alternative to increase nutrient intake of malnourished children.

**Keywords:** *Pie, Biscuit Flour, Soy Isolate.*

## INTRODUCTION

Malnutrition rates remain alarming in children under 2 years. Based on the Basic Health Research data (Riskesdas) 2013 shows that children malnutrition prevalence has been increasing since 2007 (4,9%, 5,4% and 5.7% in 2007, 2010, 2013 respectively)<sup>1,2,3</sup>. The prevalence of malnutrition in East Java also increase from 12.1% (2013) to 12.3% (2014) <sup>4</sup>. The effects of malnutrition on human performance, health and survival have been the subject of extensive research for several decades and studies show that malnutrition affects physical growth, morbidity, mortality, cognitive development, reproduction, and physical work capacity.

Malnutrition is an underlying factor in many diseases particularly in children, and it contributes greatly to the disability-adjusted life years worldwide. Malnutrition is particularly prevalent in developing countries, where it affects one out of every three preschool-age children.

The primary determinants of malnutrition, as conceptualized by UNICEF relate to unsatisfactory food intake, severe and repeated infections, or a combination of the two<sup>5</sup>. The nutritional needs of children during the first 6 months can be delivered by mother breast milk, however at 6-24 months of breast milk is not enough to meet the nutritional needs of child food <sup>6</sup>. The 1,000 days between pregnancy and a child's 2<sup>nd</sup> birthday are the most critical time for positive impact on a child's cognitive and physical development. The right nutrition for the mother and for the child during this time can have a profound impact on the child's growth and development and reduce disease risk, as well as protect the mother's health. Undernutrition during 1000 days of life is a major determinant of stunting and can lead to consequences such as obesity and nutrition-related non-communicable diseases in adulthood.

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Recently, Indonesian government implemented a program to support and improve the nutritional status of children by provision of complementary food<sup>6</sup>. Complementary food for children 6-24 months in the form of biscuits containing macro and micro nutrients needed for children growth and development<sup>7,8</sup>. Each pack of PMT Toddlers consists of 12 pieces of biscuits or 540 calories (45 cal/biscuit). Ages 6-11 months are given 8 pieces/day and 12-59 months are given 12 pieces/day. However, special attention need to be given to the effectiveness of the program due to low acceptance. Therefore this study was necessary to improve the acceptance by re-formulation a more attractive complementary food

Pie is one of a popular snack in Indonesia. The solid texture of the pie can be introduced in toddlers because of the ability to chew the children<sup>9</sup>. Indonesian people usually serve pie with cream fla, fruits, and gelatin. In this study, the formulation of pie can be served with cream fla based purple yam flour. Sweet purple has a good quality in terms of nutritional content, especially carbohydrates, vitamins and minerals. The objective of this research was

to improve the acceptance of the complementary biscuit by adjusting the biscuit flour into a pie with fla that has different flavor and more appealing to the children.

## METHOD

The design used in this study was experimental by giving variation in the additional level of biscuit flour and completely randomized design. The research was conducted in the Department of Nutrition of FKM Unair. This study was approved by the ethics committee of the Faculty of Public Health Airlangga University with No. 645-KEPK on December 19<sup>th</sup>, 2017.

The main ingredients used to make crust pie are wheat flour, butter, powdered sugar, eggs and salt. The variation level of complementary biscuit flour (ranging 0-15%) and soy protein isolate (0-13%) was substituted by wheat flour. The fla making material consists of sago flour, granulated sugar, milk powder and purple yam flour. The formula and proportions of each ingredient for the control formula (F0) and the treatment formula (F1, F2, and F3) are listed in Table 1.

**Table 1: Ingredients of pie in different formulas**

Ingredients	Formula							
	F0		F1		F2		F3	
	n(g)	%	n(g)	%	n(g)	%	n(g)	%
<b>Crust</b>								
Wheat flour	280	53	205	39	165	31	130	25
Mentega	125	24	125	24	125	24	125	24
Sugar	60	11	60	11	60	11	60	11
Egg	60	11	60	11	60	11	60	11
Salt	2	0	2	0	2	0	2	0
<b>Substitution Crust</b>								
Complementary biscuit flour	0	0	25	5	55	10	80	15
Soy Protein Isolate	0	0	50	9	60	11	70	13
Total	527	100	527	100	527	100	527	100
Fla								
Sago flour	80	50	80	50	80	50	80	50
Sugar	50	31	50	31	50	31	50	31
Milk Powder	20	13	20	13	20	13	20	13
Purple Sweet Potatoe Flour	10	6	10	6	10	6	10	6
Total	160	100	160	100	160	100	160	100

Sensory evaluation was conducted to determine the acceptability of product developed. 30 Panelist

were selected among mothers in Posyandu Tenggilis Mejoyo Surabaya, on the based on their willingness to

participate. Four different coded samples were served to the panelists. Sensory scores for different attributes like colour, appearance, texture and taste. The codes of samples include; 1=very bad, 2= bad, 3=middling, 4=good and 5=very good. Comparison of sensory scores and nutrition composition between formula were tested by analysis of variance (ANOVA) Friedman. The significantly different score between formula from ANOVA was analyzed using wilcoxon signed ranks test.

### RESULT AND DISCUSSION

The result of experimental data obtained by sensory and nutritional analysis result. Selected formula was considered by the calculation of sensory and nutritional analysis result. The content of macro nutrients in pie on each treatment formula (F1, F2, and F3) has an increase in protein and fat content compare than F0. Table 2 shows the distribution of panelist preferences to the pie treatment formula based on the assessment of color, aroma, texture and taste. After the calculation of nutritional value and respondent responses, formula with the highest weight value is formula two (F2), so it can be concluded the selected formula.

**Table 2: Responses for different formulations of pie containing complementary biscuit flour**

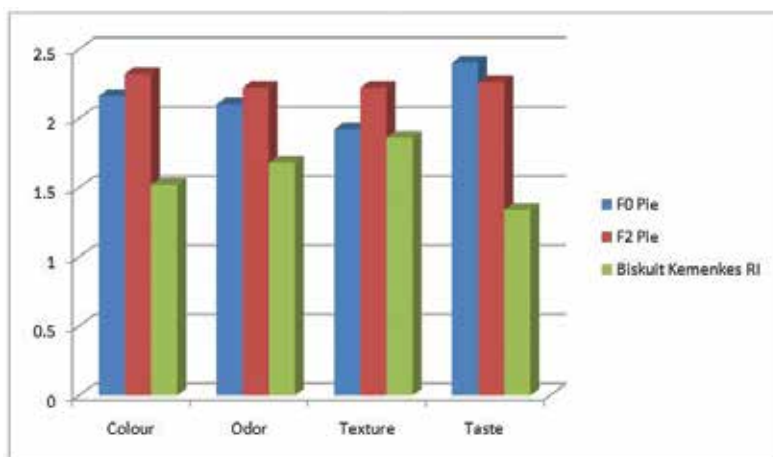
Formula	Dependent Variable			
	Color	Flavor	Texture	Taste
F0	4	4	4	4
F1	2,3	3	2,3	2,3
F2	3,4	3	4	3,4
F3	3	3	3	2,3

**Proximate Analysis:** Proximate analysis test result shows in table 3. The content of protein and fat decreased compare to complementary biscuits on protein, fat and carbohydrate no significantly different. Serving recommended if the selected formula used to replace the role of complementary biscuit is 4 pieces of pie/day. Whereas if functioned as a snack or snack foods enough 2 pieces of pie in a day can already meet 10-15% of daily nutritional needs based on Indonesian RDA<sup>11</sup>.

**Table 3: Nutritional content of selected formula, complementary biscuit and RDA (100 g)**

Formula	Energy (Cal)	Protein (g)	Fat (g)	Carb (g)
Selected formula	361.7	8.8	8.7	61.8
Complementary Biscuits	450	9	14	71
Pie/Serving Size	104.9	2.5	2.5	17.9
Standard (10-15% RDA)	112,5	2.6-3.9	6.6	23.25

**Acceptance Test:** Color is one of important quality attributes for consumer acceptance of biscuit<sup>13</sup>. The acceptance test of biscuit by untrained panelist (mothers) was variative. The highest level of favorite color is second formula biscuit (F2) (mean rank = 2.32), followed by pie control formula (mean rank = 2.16) and which received the lowest score is the complementary biscuit (mean rank = 1.52). In F2 the appearance of the crust pie color is rather brown than F0 tends to be pale due to the effect of the addition of soy protein isolate. Pie color is preferred over the bundle of MP-ASI because in the pie there is a purple flame fla field that provides a variation of purple color.



**Figure 1: Responses of panelist to different formulas**

On the odor/smell aspect, the best result is the pie with F2 (mean rank = 2.22), then the pie of control formula (mean rank = 2.1) and the lowest score is the MP-ASI biscuit. In the control formula pie and the second formula there is no significant difference ( $\alpha = 0.15$ ) has a neutral scent similarity. While the aroma of the second pie formula (F2) compared to biscuit MP-ASI have significant difference ( $\alpha = 0.07$ ). Biscuits MP-ASI kemenkes RI has a strong aroma of milk that tends to be boring. A positive hedonic value of food, or food reward, is a powerful determinant of eating behavior<sup>14</sup>.

The highest texture aspect score was pie with the second formula (F2) (mean rank = 2.22), then the pie with the control formula (F0) (mean rank = 1.92) and the lowest score was the MP-ASI bikuit Kemenkes RI rank = 1.86). In the pie F0 and F2 have a texture that is not significantly different ( $\alpha = 0.83$ ), whereas F2 with biscuit MP-ASI Kemenkes RI has significant difference ( $\alpha = 0.035$ ). This is because the texture of the biscuit is harder than the texture of the pie.

On the taste aspect that received the highest rating is the Formula control pie (F0) (mean rank = 2.4), then the pie with the second formula (F2) (mean rank = 2.26) and the lowest score is the MP-ASI biscuit RI (mean rank = 1.34). In the control formula pie and the second formula has no significant difference ( $\alpha = 0.18$ ) while the pie formulas (F2) have significant differences when compared with the biscuit MP-ASI Kemenkes RI ( $\alpha = 0.0$ ). The taste of biscuits tends to be out of favor because it creates a bitter taste at the end.

The assessment of preferred level by untrained panelists (Children aged 12-24 months) based on figure 3, shows the highest preference for pie with formula modification (F2) (Mean rank = 2.24), then on pie with control formula (F0) = 2.18) and who got the lowest favorite rating is biscuit MP-ASI Kemenkes RI. There was no significant difference between F0 and F2 ( $\alpha = 0.317$ ) whereas F2 and biscuit MP-ASI Kemenkes had significant difference ( $\alpha = 0.001$ ). Pie is preferred by children aged 12-24 months because of the more color aspect has a variation of purple color so it is more interesting, from the aspect of the aroma has a neutral aroma, softer texture if compared with the texture of biscuits and sweet pie flavor tend to be harmonized than bikuit who have after bitter taste.

The more proportion of pie substituted with MP-ASI biscuit flour and soy protein isolate is more acceptable for

children aged 12-24 months, providing variations of the form of MP-ASI in addition to biscuits, the suggestion of consuming pie in a day is less than the recommended consumption of biscuit MP-ASI Kemenkes in a day. The weakness is the content of macro nutrients in 100 grams of pie is still lower when compared to the content of macro nutrients biscuit MP-ASI Ministry of Health RI.

## CONCLUSION

The best modified Pie Formula is the second formula (F2) which is a pie with substitution of 10% biscuit of MP-ASI biscuit and 11% soy protein isolate. The content of macro nutrients in pie F2 per 100 grams lower than biscuit MP-ASI Ministry of Health RI. Pie F2 has a higher acceptance than the biscuit MP-ASI Kemenkes RI.

**Ethical Clearance:** This study was approved by the ethics committee of the Faculty of Public Health Airlangga University with No. 645-KEPK on December 19, 2017.

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# Misclassification of Nutrition Status among Elderly Based on Combination of Stature Predictor

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## ABSTRACT

The combination of arm span and knee height as the stature predictors on elderly was arranged to obtain the most precise and accurate prediction of actual height. However, there was not much research that calculated prediction errors. This study aimed to measure the size of the misclassification of elderly nutritional status which calculated by predictive combination regression model. The study was an observational study with cross-sectional design. The study population was 60-69 years old men and women in Wonogiri District, Central Java. The sample size were 65 men and 71 women, which were chosen purposively in the community. Anthropometric measurements on knee height and arm span and the actual height were done by standardize technique. Data of BMI were analysed using Friedman pos hoc Wilcoxon test then classified to nutrition status to calculate sensitivity and specificity. Among the men subjects, the overweight and underweight status using BMI were overestimated by 8.3% and 12.5%, respectively. Among the women subjects, overestimation also occurred on underweight by 12.5%. In all respondents, underestimation of underweight was 7.2% and overestimation in the normal nutritional status was 3.7%. It was concluded that some misclassification of BMI, by predicted height among elderly based with combination regression model was found.

**Keywords:** *misclassification; height; combination of predictors; nutrition status*

## INTRODUCTION

Body Mass Index (BMI) was a simple calculation to monitor nutritional status in individuals (aged >18 years) by comparing body weight (in kilograms) and squares of height (in meters) then categorized them.<sup>1</sup> Therefore, height was an important variable to assess nutritional status at the elderly. However, the height measurement generally performed in stand position could not be applied to elderly people who have lost the ability to stand. Thus, World Health Organization recommended arm span and knee height as a predictor of elderly height.<sup>1</sup>

Using arm span and knee height as a predictor of height in elderly would directly affect the results of calculation of BMI and determine the nutritional status. When overestimation occurred at the height it would increase the prevalence of underweight while whereas an estimate below the actual height (underestimation) would increase the prevalence of overweight. The condition would be affected to make large prevalence of malnutrition in the elderly, further impact will also lead to inaccuracy in health policy making related to those problems.<sup>2</sup>

Phenomenon of overestimation and underestimation of high prediction results would affect the categorization of nutritional status and affect the prevalence of nutrition in the elderly. Research in Sweden showed the lowest prevalence of underweight with knee height BMI compared to actual BMI and Chumlea.<sup>3</sup> Prevalence of obesity was higher (overestimation) based on measurement of knee height BMI than actual BMI. Obesity diagnosis in men based on knee height BMI was 26.2% while based on actual BMI was 17.5%. It could be

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interpreted that the prevalence of obesity based on knee height BMI was twice higher than actual BMI.<sup>3</sup> Other studies have shown that overestimation of height was calculated based on knee height on female respondents reached 2.22 cm and caused underestimation of BMI reached 10%.<sup>4</sup>

A study developed a formula using two predictors. Theoretically it was done because the more variables x added the more degrees of freedom lost. So, the study arranged regression model of the elderly by combining arm span and knee height.<sup>5</sup> The predictor formula were:

$$\text{Women} = 40.915 + (0.457 \times \text{AS}) + (0.818 \times \text{KH}) \quad \dots(1)$$

$$\text{Men} = 34.426 + (0.513 \times \text{AS}) + [0.813 \times \text{KH}] \quad \dots(2)$$

With:

(1) : Formula for predicted women’s elderly height.

(2) : Formula for predicted men’s elderly height.

AS : The measurement result of arm span in centimeters.

KH : The measurement result of knee height in centimeters.

The study showed highest overestimation happened at Chumlea’s formula in men was 6.01 cm and highest underestimation happen at Fatmah’s formula in women group was -0.72 cm.<sup>5</sup> While, combination predictor showed the lowest underestimation in men and women with the smallest average difference compared with the long and high knee predictors.<sup>5</sup>

The combination of predictors has more accurate ability to predicted height in the elderly. However, no further calculation has been done on body mass index and diagnosed malnutrition in the elderly.

## METHOD

**Research Design:** The type of research was observational analytic with cross sectional study. Cross sectional study was suitable for correlation research with the observation approach (point time approach).<sup>6</sup>

**Study Subject and Sample Size:** Actual BMI as dependent variable, combination predictor’s BMI as independent variables. The results of this study presented in men and women’s groups.

Study population at this study was individuals aged 60-69 years in Wonogiri sub district at January – July 2017. Inclusion criteria were individuals in health conditions, able to stand upright and willing to be

respondent by filling informed consent. The exclusion criteria were when the individuals have unable stretched his or her arms properly (straight) because of a broken or physical disability and experiencing foot fractures and or using prosthetic limbs. The sample selection method was purposive sampling included 65 men and 71 women.

**Measurements:** Measurements on each respondent were repeated three times and then taken the mean value of the measurement results by standardized enumerator and standardized measurement (shows in Fig 1). The measurement results were recorded by the researchers on the provided sheet.

Arm span was measured with arm line that was modified. There was a tape measuring (“BUTTERFLY” brand) with a precision of 1 mm attached to the aluminum rod (shows in Fig 2). Arm span was measured from the tip of the middle finger of one hand to the tip of the middle finger of the other hand with the individual standing with their back to the wall with both arms abducted to 90°, the elbows and wrists extended and the palms facing directly forward. Body mass index estimated from the arm span was calculated through combination predictors and Fatmah formulas.<sup>7</sup>

Knee height was measured with knee height caliper belonging to Nutrition Laboratory of Public Health Faculty, Diponegoro University with 1 mm of accuracy (shows in Figure 2). Measurements were performed on the left knee with the perfect sitting position (upright body, hands free down and facing directly forward). Make sure each knee forms 90° angle, consisting of a fixed part, which has been positioned in the plantar surface of the foot (heel) and movable part, which was positioned over the patella. Body mass index estimated from the arm span was calculated through combination predictors and Chumlea’s formulas.<sup>8</sup>



**Figure 1: (1) Knee height caliper; (2) Digital scale for weight measurement; (3) Actual height measurement; (4) Arm span measurement**





(1)



(2)

**Figure 2. (1) A respondent was measured the arm span by enumerator; (2) A respondent was measured the knee height by enumerator**



(1)



(2)

**Figure 3: (1) A respondent was measured the actual height by enumerator; (2) A was measured the weight by enumerator**

Actual height was measured by microtoise “GEA” SH-2A series with 1 mm of accuracy (shows in Figure 3). Standing height was measured with microtoise against the wall on barefooted subjects, with their heels together and the heels, buttocks touching the wall.

Digital scales brand “CAMRY” series EB9-4A with 0.1 kg accuracy to measure weight (shows in Figure 3). Enumerator asked respondents to remove shoes or footwear, jackets, hats, and others. Then, they allowed them to step up onto the digital scale, right in the middle of the stamping place. The enumerator adjusted respondent’s position to stand upright with his eyes

facing forward and not moving. They also ensured that the respondent was not touching or being touched or touched by another. Process of measuring the respondent shown in Figure 1, Figure 2 and Figure 3.

## RESULTS AND DISCUSSIONS

**Mean Difference Test Of Body Mass Index:** Table 1 shows that there’s difference BMI between combination predictor’s formula, Chumlea’s formula and Fatmah’s formula in men and women. There’s only BMI’s combination predictor formula that similar with BMI’s actual predictor in men ( $p=0.883$ ) and women ( $p=0.184$ ).

**Table 1: Result of Mean Difference Test**

BMI (kg/m <sup>2</sup> )	Sex	
	Men*	Women**
Actual	21.46 ± 3.28	21.93 ± 3.45
Combination Predictor	21.40 ± 3.26	21.94 ± 3.44
Chumlea	21.32 ± 3.27	20.22 ± 3.18
Fatmah	20.97 ± 3.20	22.15 ± 3.47
p value	<0,001 <sup>a</sup>	<0,001 <sup>b</sup>

**Note:**

\* Normality test for Actual BMI  $p=0.192$ , Combination Predictor’s BMI  $p=0.088$ , Fatmah’s BMI  $p=0.027$ , and Chumlea’s BMI  $p=0,200$

\*\* Normality test for Actual BMI  $p=0.040$ , Combination Predictor’s BMI  $p=0.047$ , Fatmah’s BMI  $p=0.031$ , and Chumlea’s BMI  $p=0,082$

<sup>a</sup> Friedman test result. Post hoc Wilcoxon test Actual vs Combination Predictor 0.883; Actual vs Chumlea 0.031; Actual vs Fatmah <0.001; Combination Predictor vs Chumlea 0,006; Combination Predictor vs Fatmah <0.001; Chumlea vs Fatmah <0.001.

<sup>b</sup> Friedman test result. Post hoc Wilcoxon test Actual vs Combination Predictor 0.184; Actual vs Chumlea <0.001; Actual vs Fatmah <0.001; Combination Predictor vs Chumlea 0,006; Combination Predictor vs Fatmah <0.001; Chumlea vs Fatmah <0.001.

The highest difference in BMI was found in the female was calculated by Chumlea’s formula (1.70 kg/m<sup>2</sup>) and Fatmah’s formula in men (0.43 kg/m<sup>2</sup>). Predictor combinations show the lowest difference.

BMI is a reliable indicator for body fatness for most people. BMI does not measure body fat directly,

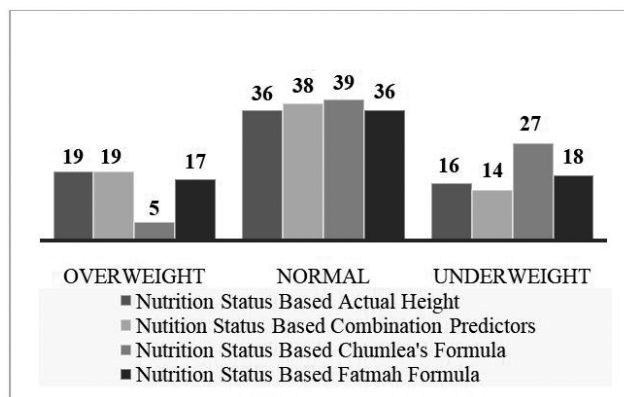


but studies have shown that BMI correlates with body fat, such as water weight and dual energy x-ray absorptiometry [8]. BMI can be considered as an alternative to direct measures of body fat. In addition, BMI methods are easy and inexpensive.

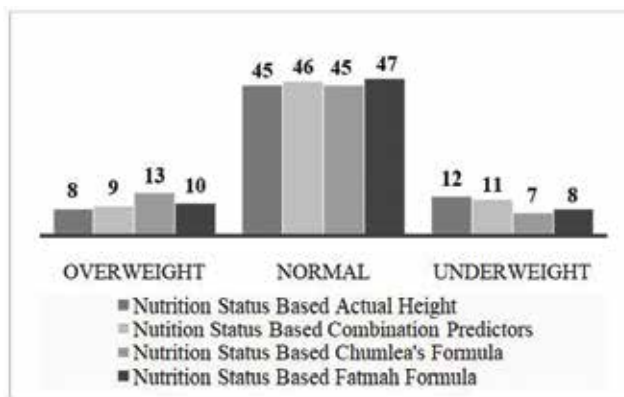
Increasing age there are physiological and pathological changes in a person. This situation makes the elderly become very susceptible to a disease. Diseases in the elderly usually occur in many organs so that drug administration must polypharmacy. Polypharmacy means the use of multiple drugs at once in a patient, more than is required logically-rationally associated with an estimated diagnosis. Among the many medications that was swallowed by elderly there was some drug interactions can lead to hospitalization or death. The main diseases that attack the elderly are hypertension, heart failure and infarction and heart rhythm disorders, diabetes mellitus, impaired kidney function and liver. In addition, there are also situations that often interfere with the elderly such as impaired cognitive function, balance the body, sight and hearing. All these circumstances cause elderly to receive treatment of many kinds.<sup>9</sup> Problems that arise when the elderly sick are the doses of drugs that would be given should right. Growing age will affected to LADME system. It means changes in drug release from dosage form, absorption, distribution, metabolism and drug excretion. In this case, the elderly group needs special attention. Drug dose calculations can be based on age, weight, body surface area and Body Mass Index (BMI). Calculation of dose with body surface area claimed most accurately.<sup>10</sup>

**Diagnostic Test On Combination Predictors to Determine Nutritional Status:** Comparison of nutritional status was calculated based on predictors and actual height in women and men group showed in Fig 4 and Fig 5.

Women's BMI which was calculated by a combination of predictors resulted 2 error in the diagnosis of nutritional malnutrition and showed an overestimation phenomenon. Although with the same diagnosis error, nutritional malnutrition that calculated with BMI of combination predictor in men showed underestimation phenomenon. In Chumlea showed high underestimation reached 11 people in women and overestimated 6 people in men. Difference in underestimation of 4 women and 4 overestimations in men if the BMI is calculated by the Fatmah formula. (Shown in Figure 4 and Figure 5).



**Figure 4: Comparison of Nutritional Status based Various Formula and Actual Height in Women Respondents**



**Figure 5: Comparison of Nutritional Status based Various Formula and Actual Height in Men Respondents**

Then, there were calculate of the sensitivity and specificity of combination predictors when used to determine nutritional status. The results of the analysis were shown on the Tab 2. The results of calculations showed sensitivity was 90.90% and specificity was 95.60%. When the value was > 80%, it mean that the regression model has a good diagnostic test for malnutrition in the elderly. Previous research in Indonesia on new diagnostic tests was performed on a body mass index measured by arm span and knee height. The results show that the length of the depa has a sensitivity value of 78% and knee height has a sensitivity of 69%. This value is at a weak strength.<sup>7</sup>

Theoretically combination predictor can give more accurate the number of elderly because more variables  $\chi$  added the more degrees of freedom lost. It is proved in this research with specificity value 95,06% and

sensitivity 90,90%. Thus the regression model with this predictor combination can be used to predict the height of the elderly in an effort to produce values with high accuracy. Thus, the risk of inaccuracy dosage of medication that would be given to sick elderly can be minimized.

**Table 2: Diagnostic Test Table**

		Nutrition Status Based Actual Height	
		Malnutrition	Normal
Nutrition Status Based Combination Predictors	Malnutrition	50	4
	Normal	5	77

Sensitivity =  $a/(a+c)$  ... (3)

Specificity =  $d/(b+d)$  ... (4)

Sensitivity of Combination Predictor =  $50/(50+5)$   
= 90.90%

Specificity of Combination Predictor =  $77/(4+77)$   
= 95.06%

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# Is the *Maternal and Child Health Handbook* a Source of Information for Maternal and Child Health Continuum of Care?

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## ABSTRACT

To ensure continuum care for maternal, newborn, and child health (MNCH), home-based records (HBRs) are expected to promote communication between healthcare providers, pregnant women and children's caregivers. WHO guidelines (2018) recommend HBRs use for MNCH, and request their effective implementation. However, information on HBRs global implementation is inadequate. This study aimed to identify implementation regarding Maternal and Child Health (MCH) handbook, an integrated HBR for ensuring continuum care. This study included literature review to explore components of MCH handbook usage, to identify researchers' acknowledgment of the handbook as a feasible source of information, and to examine existing national/subnational level implementation information. Components of the handbook usage in this study focuses on *distribute*, *explain*, and *record/multi-record* by health personnel, and *receive*, *retain*, *bring/multi-bring*, and *read* by women/mothers. While existing nationally representative data of many countries allows us to measure *distribution/receipt* and *retention* of HBRs regarding child immunization, some countries have used MCH handbook in surveys to obtain more information (e.g., antenatal/birth records) for their health policies. The researches that have used the handbook for information on different stages of MNCH may have indicated its implementation maturity in their countries.

**Keywords:** *continuum of care; maternal, newborn, and child health; home-based record; Maternal and Child Health Handbook; Indonesia*

## INTRODUCTION

A continuum care must be implemented for every woman and child, especially for the first 1000 days after conception, the most important period for their well-being.<sup>1,2</sup> To ensure that maternal, newborn, and child health-care is provided continuously, platforms for connecting caregiving sites, including households, communities, and clinical-care settings to the life-course (pregnancy, childbirth, postnatal, childhood, and adolescent period) are necessary. Home-based records (HBRs) offer mobility, accompanying subjects from their homes to different levels of health facilities.<sup>3,4</sup> HBRs are potential tools for sharing information with relevant health

personnel and caregivers, and tracking individuals' health trajectories,<sup>3</sup> as long as they are used conscientiously.<sup>4,5</sup>

According to World Health Organization (WHO), "A home-based record is a record of an individual's health status and their history of health services received (primarily maternal, newborn, and child health: MNCH). The record is kept in the household by the client or by the caregiver. For MNCH, HBRs can take different forms, such as antenatal care records, immunization cards, child health booklets, or an integrated maternal and child health (MCH) handbook. Besides being important for data collection and surveillance tools, HBRs can facilitate behavioral change, communication, and patient-centered care."<sup>3</sup> WHO recommends the use of HBRs along with facility-based records for the care of pregnant women, mothers, newborns, and children, to improve: care-seeking behaviors; male involvement and support in the household; maternal and child home care practices; infant and child feeding, and communication between health personnel and women/caregivers.<sup>3</sup>

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The necessity of effective implementation of HBRs for MNCH care is emphasized by WHO guidelines as HBRs' ability to contribute to health outcomes depending on the implementation quality.<sup>3</sup> However, little is known about HBRs implementation in various settings. Most reports have examined HBRs implementation with a focus on child immunization programmes,<sup>6</sup> and the literature available on other types of HBRs implementation is insufficient. MCH handbook has been reported as an integrated format of HBRs for MNCH as it has advantages for monitoring and facilitating continuum care, considering a child's life course.<sup>7-8</sup> MCH handbook covers all MNCH stages, from antenatal care to child growth monitoring and development. By February 2016, at least 25 countries had used a national standard format of the handbook.<sup>9</sup> Therefore, this study aimed to review the implementation of MCH handbook in several settings to determine its measurable information and use in continuum care.

## METHOD

First, a literature review was conducted to identify studies outlining the components and/or degrees of MCH handbook usage, which influence their effectiveness. Second, the existing data available in the public domain were reviewed to identify information for national/subnational implementation.<sup>10-12</sup> Third, Indonesian literature was reviewed to identify researchers' acknowledgment of MCH handbook use as a tool for data acquiring. In Indonesia, MCH handbook was introduced in 1997, after a pilot implementation in a province. A ministerial decree was passed for its implementation in 2004, and now, it is implemented in all provinces.<sup>13</sup>

## RESULTS

Kusmayati et al. (2007) identified some components of handbook use and its effectiveness regarding preferable knowledge and practices among mothers. These involved health workers explaining MCH handbook contents (*explain*), mothers reading the handbook (*read*), and mothers frequently taking to health services (*bring*).<sup>14</sup> Hikita et al. (2018) suggested that both usage by health personnel (i.e., *explain*) and maternal socio-economic factors (e.g., maternal education) often influenced mothers to read (*read*) and/or to self-record (*self-record*).<sup>15</sup> Osaki et al. (2018) examined the effective use of MCH handbook and

compared it to the low-use, to promote the consecutive services received from pregnancy to early child-rearing; preferable home practices included feeding and sick childcare, and encouraging husbands' roles in MNCH. The handbook's effective use identified in the study included health personnel distributing to their clients (*distribute/receive*), explaining its contents (*explain*), and multiple health personnel adding records to the same handbook (*record; multi-record*). Family members (*family-read*), as well as pregnant women and mothers read MCH handbook (*read*), and took it to multiple health service centers on several occasions (*bring; multi-bring*).<sup>7</sup> In other words, the handbook's effective use by both health personnel, women and their family members, were considered as achieving the objective to facilitate the continuum care.

Studies on MCH handbook effectiveness identified health personnel, women/mothers, and children other caregivers as users. MCH handbook use includes: i) *distribute*, ii) *explain*, iii) *record*, iv) *receive*, v) *retain*, vi) *bring*, vii) *read*, viii) *self-record*, ix) *family-read*, x) *multi-bring*, and xii) *multi-record*.

Regarding its distribution and retention, basic information on handbook's implementation is often unavailable. Demographic Health Surveys (DHSs) have allowed us to determine the prevalence of HBRs for child immunization considering the components *receive/receive* and *retain*.<sup>6</sup> For example, based on the latest available DHS data sets of 67 countries, prevalence of HBRs among 12-23 month children is diverse (42.4%-100.0% for *receive*; 24.3%-97.5% for *retain*).<sup>6</sup> Among them, some countries have regarded MCH handbooks as HBRs in their respective DHSs. If DHSs were repeatedly conducted and no other records were used after MCH handbook's implementation, DHSs could monitor the prevalence of child immunization.

Some countries like Kenya, Indonesia, and Burundi use MCH handbooks in their DHSs for birthweight data as these are important for determining child's vulnerability to illnesses and survival.<sup>16-18</sup> For example, birth weight was recorded in Kenyan DHSs questionnaire (i.e., whatever was available: Kenyan MCH handbook, other written record, or mother's recollection). Indonesian DHSs also helped to identify MCH handbook distribution points and facilities for antenatal care. Pregnant women in Indonesia received MCH handbook during antenatal care from private or

public health facilities. The distribution points for those who had received MCH handbook differed depending on residence settings and economic status.<sup>13</sup> This finding may facilitate the efficient procedures for universal access by beneficiaries in different settings, and may also confirm the role of professional organizations committed to the distribution.

Another periodic survey in Indonesia, Basic Health Survey (*RISKESDAS*), provides specific information on MCH handbook both at national and sub-national levels. According to *RISKESDAS* conducted in 2010 and 2013, the adults responsible for infants who received MCH handbook increased from 46.6% to 57.3%, while non-receivers decreased from 29.3% to 17.4%.<sup>11-12</sup> Data from 2013 showed that variation in handbook receive (52.1%–96.1%) and retention (24.3%–81.8%) between provinces were common. MCH handbooks were placed outside of the household (e.g., health facilities; from 17.0% to 19.1%), loss of MCH handbooks (from 7.1% to 6.2%) was also reported. Although the percentage of retention has increased, the unimproved percentages of loss or MCH handbooks placing outside of homes requires scrutiny.

*RISKESDAS* 2013 assessed records in MCH handbook to evaluate birth preparedness and complication readiness in five years preceding the survey. These records could reflect the communication between clients and health personnel and enable the consensus among the main stakeholders involved in birth planning.

In other words, *RISKESDAS* intends to collect information on various practices employed: **explain**, and **record** to establish consensus between health personnel and clients through MCH handbook. However, relevant records in MCH handbook were frequently not filled (e.g., planned birth assistant name: 35.4%; blood donor name: 12.1%); this may be due to health personnel's failure to record information or consensus failure between health personnel and clients.<sup>12</sup>

Existing DHSs and relevant data in public domain allow us to estimate the distribution and retention of MCH handbooks, and to measure its distribution and retention on child vaccination and beyond. Countries having MCH handbooks can have a wider range of information that could be used for policy evaluation for MNCH compared to program-specific HBRs.

Takeuchi et al. (2015) reviewed articles based on samples collected in Japan, where MCH handbook has been used for seventy years. Thirty seven studies from January 1980 to May 2017 were identified using the key word "Maternal and Child Health handbook." Seventeen studies had used MCH handbooks as data sources for health information at later in life.<sup>5</sup> This demonstrates that researchers have acknowledged MCH handbook as health information potential source when it is well kept at home (e.g., more than 80% of university students could submit their immunization record from MCH handbook). This condition assumed that recording in and retained MCH handbook for a certain duration, demonstrating the effective use of MCH handbook.

Literature review on Indonesian articles showed that Indonesian researchers have referred MCH handbook data to assess mothers and children health from the conception to five years. Sixty-one studies after 2000 were identified using "*Buku KIA*" key word, through Google Scholar. Twelve articles in 2010s had referred MCH handbook data related to pregnancy (e.g., background information,<sup>19</sup> tetanus toxoid injection,<sup>20</sup> and iron tablets<sup>21</sup>), birth records (e.g. birth height<sup>22-23</sup> and birth weight<sup>24-25</sup>), breastfeeding,<sup>26</sup> and child immunizations.<sup>27-28</sup>

## DISCUSSIONS

The findings demonstrate that the components of MCH handbook use include **distribute**, **explain**, and **record** by health personnel, and **receive**, **retain**, **bring**, and **read** by women/mothers. When MCH handbook is designed for mothers/caregivers to fill, it includes **self-record**. Sometimes, family members read it (**family-read**). **Multi-bring** and **multi-record** are included as components when MCH handbook acts as a connecting care-giving sites across different MNCH stages. While the existing nationally-representative data allows us to measure **distribution/receipt** and **retention** of HBRs focusing on child immunization in many countries, some countries have used the handbook to evaluate their health policies. Researches that have used MCH handbook on the different stages of MNCH may have indicated the maturities of its implementation.

Components of usage could be categorized as variables in implementation research. WHO guidelines did not identify any studies that could help answer the question: For women during pregnancy and after

birth, and for caregivers (P), does any component of HBRs usage (I), compared to inconsistent use of it (low use) (C), improve health service outcomes (O)?<sup>3</sup> For further assessment of the effectiveness of MCH handbook intervention, it is necessary to operationalize its components.

MCH handbook is being used more than ever in Indonesia. However, the varying levels of prevalence, and retention in different places indicate more efficient procedures needed to support the continuum care. Indonesian literature has measured health personnel's practices beyond distribution, but not across facilities (e.g., public and private; health centers and hospitals) nor across timings or focuses (e.g., different stages of MNCH period). Logically, more emphasis is needed to measure the recordings after its distribution. Ensuring the information correctness recorded is another issue to be crosschecked with health facilities. Effective record-keeping services provided to beneficiaries are a pre-condition for the effective use for continuum care.

While maturity of MCH handbook implementation increased, Indonesian researchers have started to acquire records on pregnancy, birth, and child health, besides child immunization. If more families retain MCH handbook until the child reaches adolescence, researchers can use it as a potential research tool. While the child immunization record is often used to estimate Expanded Programs on Immunization coverage at 12–23 months,<sup>6</sup> MCH handbook can help to explore various aspects of continuum care. Finally, privacy needs to be secured when researchers use the handbook data.

Further research can assess implementation issues such as: i) whether women have access to MCH handbook, and if not, what are the factors; ii) whether women are active users, if not, what are the factors; iii) whether women receiving quality care, and whether their records are provided; and iv) whether women/children enjoy better health and provided health care services. This study is the first in exploring measurable information for facilitating effective HBRs and ensuring continuum care through MCH handbook use.

## CONCLUSIONS

While use of MCH handbook/HBRs for MNCH is necessary, the information to monitor its effective implementation is insufficient. Researchers can play

important roles in ensuring that MCH handbook/HBRs provide maximum benefits to mothers and children by assessing the efficiency, equitability and the provided care quality.

**Conflict of Interest:** No research fund is applied. The author has no conflicts of interest.

**Ethical Clearance:** The study uses data without individual case identification codes.

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# The Effectiveness of Training and Mentoring Activities to Improve Cadre Performance in Child Growth Monitoring (CGM)

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## ABSTRACT

Routine growth monitoring of children in Indonesia is done through Posyandu. Posyandu cadres who have sufficient knowledge about Child Growth Monitoring (CGM) are needed to improve early detection of child malnutrition to prevent stunting. The ability to use WHO-Anthro software followed by mentoring programs is expected to help increase cadre capacity in CGM performance. This study aims to determine the effectiveness of training and mentoring activities in using WHO-Anthro software to improve cadres' performance in monitoring children's growth. This research was a collaborative research with the Ministry of Health. This experimental research used one group pretest-posttest design. This research was conducted on 30 female cadres from 30 Posyandu in Semarang City, Indonesia. Intervention activities and data collection were carried out for three months. Data were analyzed by comparison tests. The results showed that after the intervention there was an increase in knowledge scores, practice scores and performance scores of cadres in CGM. It was concluded that training and guidance on the implementation of WHO-Anthro software improved cadre performance in CGM.

**Keywords:** *Posyandu cadre, child growth monitoring, WHO-Anthro, nutritional surveillance*

## INTRODUCTION

In Indonesia, child growth monitoring activities for early detection of growth disturbances are carried out through activities at Posyandu. The existence of Posyandu as an effort to early detection of community-based child growth disorders, was initially promoted by Unicef in the 1980s with the aim of weighing children and heavy plots on growth charts for early detection of growth faltering, thus enabling community workers (cadres) to advise mothers about how to improve the growth of disturbed children<sup>1</sup>. The existence of Posyandu has been proven to play an important role in survival activities through growth monitoring and promotion activities (Growth Monitoring and Promotion) in children in Indonesia<sup>2,3</sup>. Like experience in many countries, child growth

Monitoring and Promotion activities are supported by community participation through volunteer labor<sup>4-6</sup>.

However, there are a number of problems related to the implementation of Posyandu in child growth monitoring activities in Indonesia, among others: there are still inadequate facilities and skills of cadres<sup>1</sup>, Posyandu cadres are volunteers, often change without being followed by training or retraining, as a result the technical abilities of active cadre are inadequate<sup>7</sup>, lack of ability which is very severe in weighing and plotting<sup>8</sup>, lack of ability of Posyandu cadres in conducting "nutritional counseling" causes nutritional education activities to become jammed or not implemented, so that toddlers who come are only weighed and recorded in Growth Monitoring Chart without adequate explanation so efforts to prevent the incidence of malnutrition are less effective<sup>7</sup>. Therefore, it is necessary to increase cadre capacity through ongoing training and mentoring activities<sup>9,10</sup> so that cadres have knowledge and self-efficacy cadres are increasing<sup>11,12</sup> so that cadres become more confident in carrying out their tasks<sup>13</sup>, related to growth monitoring and providing nutrition counseling.

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Nutrition surveillance activities for early detection of nutritional problems in infants required strengthening of information systems in cadres. Strengthening of information subsystem in this matter was urgent so need to do the joint effort to push for all activity recording and data processing result of measurement of nutrition status gradually needed to be changed towards digital or computation.

Currently, the anthropometric index can be calculated using the World Health Organization’s Child Growth Standard (WHO, 2007) using WHO-Anthro software. This application is simple enough to operate but is able to calculate anthropometry indicators and can present the data in the form of individual charts more accurately<sup>9</sup>. Introducing the used of WHO-Anthro software to cadres expected to improve the validity of weighing data processing Posyandu. Thus, this study aims to determine the effectiveness of training and mentoring activities in using WHO-Anthro software to improve cadres’ performance in Child Growth Monitoring (CGM). The location of this study was Semarang City because the participation rate for Posyandu was 70.0% with the percentage of children under five coming and weighing 80.5%<sup>8</sup>.

**MATERIAL AND METHOD**

**Research Design and Study Subject:** This research is an experimental study with the design of a pretest-posttest group without a control group with the nonrandom sample. The study was conducted on 30 female cadres from 30 Posyandu in health care Pudukpayung, Semarang City, Indonesia.

**Data Collection:** Data collection was carried out using a questionnaire consisting of seven parts. Part 1 is the characteristics of respondents consisting of 6 questions, including age, occupation, length of time as cadres, education, training history as cadres and frequency of cadre training. Section 2 is knowledge consisting of 37 questions, Part 3 is an attitude consisting of 29 questions. Section 4, practice consists of 29 questions. Section 5 is self-efficacy consisting of 30 questions. Section 6 is the cadre performance in Child Growth Monitoring (CGM), including (a) monitoring the nutritional status of children under five (2 questions), (b) data quality (7 questions), (c) data processing (5 questions), (d) cadre data analysis (3 questions), (e) program success (3 questions) and (f) achievement of cadre program targets (1 question).

The intervention consisted of training and mentoring the use of the Anthro WHO software for data management in Posyandu. Cadres are taught how to install Anthro WHO software and how to use the three main menus: (a) Anthropometric Calculator, b) Individual Assessment, and (c) Nutrition Survey, according to manual<sup>14</sup>. Then the trainer teaches the use of child growth monitoring charts. Intervention activities and data collection were carried out for three months. Data were collected twice (pretest and posttest), before and after the intervention.

**STATISTICAL ANALYSIS**

Data analysis was done with IBM SPSS Statistics. Research Method. Data distribution was tested using the Kolmogorov Smirnov test in which data is normally distributed if  $p \geq 0.05$ . In answering the research objectives and proving the hypothesis, statistical tests were carried out using Mann Whitney, Wilcoxon and Rank Spearman tests.

**FINDINGS**

**Characteristics of Respondents:** Table 1 showed that most of the cadres were housewives who were not working (80.0%). The education level of cadres was mostly highly educated (83.3%). Two of the three cadres claimed to have attended the training twice. The average age of cadres was at 45.4 years with the average length of duty as a cadre for 10.1 years.

**Impact of Intervention:** The results showed an increase in the scores of cadre knowledge, attitudes, practices, self-efficacy and cadre performance in CGM (Table 2), but only scores of cadre knowledge, practice, and cadre performance in CGM were significantly different between before and after the intervention ( $p < 0.05$ ). A score of cadre attitudes and cadre self-efficacy did not differ significantly between before and after the intervention ( $p \geq 0.05$ ).

**Table 1: Characteristics of Respondents (n = 30)**

Characteristics of Respondents	N	%
<b>Work Status</b>		
Workers	6	20,0
Not Workers	24	80,0
<b>Education Level</b>		
Low	5	16,7
High	25	83,3

Conted...

Training History as Cadres		
Never	10	33,3
Ever	20	66,7
And Frequency of Cadres Training		
Mean ± S.D	1,4 ± 2,51	
Median (Min–Max)	0,0 (0,00–10,00)	
Age (Years)		
Mean ± S.D	45,4 ± 6,44	
Median (Min–Max)	45,5 (28,00–56,00)	
Length of Duty as Cadres		
Mean ± S.D	10,1 ± 9,31	
Median (Min–Max)	6,5 (1,00–35,00)	

**Factors related to changes in cadre performance:**  
 The relationship between personal characteristics of cadres and changes in knowledge, attitudes, practices, self-efficacy and CGM performance scores are presented in Table 3. Based on Table 3, the cadre’s personal characteristics are significantly related to changes in knowledge scores are the level of education of cadres and history have attended cadre training, while those related to changes in attitude scores are the status of cadre work, and related to changes in practice scores are the frequency of cadre training. However, no cadre personal characteristics were significantly associated

with changes in self-efficacy scores. The personal characteristics of cadres significantly related to changes in CGM performance scores are cadre work status.

Table 4 shows the results of correlation analysis between various variables, including changes in knowledge score, attitude scores, practice scores, self-efficacy scores, and CGM performance scores. The results showed a positive correlation between changes in knowledge scores and changes in practice scores ( $r = 0.407$ ;  $p = 0.026$ ). While there is no significant correlation between the other variables (Table 4)

**DISCUSSION**

The skills of cadres in the management of anthropometric measurement data can be increased by providing training in accordance with procedures. During this time cadres have received basic training and refresher on service activities in Posyandu with conventional approaches, namely training with lecture methods, accompanied by discussions with trainers. One of the weaknesses of the conventional method is that it only increases knowledge, but does not improve the skills of trainees. The method used in training should be adapted to the problems, situations, and conditions of the trainees so that the skills and performance of Posyandu cadres can increase<sup>15</sup>.

**Table 2: Comparison of pretest and posttest score (n = 30)**

Variable	Pretest Score	Posttest Score	Δ (Score Change)	Percentage of Δ (%)	p
<b>Knowledge</b>					
Mean ± S.D	64,1 ± 2,88	64,7 ± 3,62	2,4 ± 2,71	4,0 ± 4,56	0,001 <sup>a</sup>
Median (Min–Max)	64,0 (58,00–70,00)	66,0 (56,00–70,00)	2,0 (-2,00–10,00)	3,2 (-2,94–17,86)	
<b>Attitude</b>					
Mean ± S.D	54,2 ± 2,34	54,7 ± 3,16	1,2 ± 1,74	2,4 ± 3,30	0,131 <sup>b</sup>
Median (Min–Max)	54,5 (49,00–57,00)	56,0 (44,00–58,00)	2,0 (-2,00–5,00)	1,8 (-3,57–9,80)	
<b>Practice</b>					
Mean ± S.D	52,2 ± 3,62	53,5 ± 3,57	1,6 ± 3,31	4,7 ± 6,57	0,048 <sup>b</sup>
Median (Min–Max)	52,5 (43,00–58,00)	55,0 (45,00–58,00)	2,0 (-3,00–12,00)	3,2 (-7,14–20,42)	
<b>Self Efficacy</b>					
Mean ± S.D	65,0 ± 15,02	64,81 ± 22,04	7,7 ± 9,97	14,6 ± 19,22	0,614 <sup>b</sup>
Median (Min–Max)	64,9 (38,83–90,33)	69,8 (0,00–90,33)	6,8 (-17,00–31,66)	8,8 (-20,65–70,88)	
<b>CGM Performance</b>					
Mean ± S.D	4,4 ± 1,37	3,6 ± 3,85	0,7 ± 1,48	0,5 ± 0,74	0,007 <sup>b</sup>
Median (Min–Max)	4,9 (0,47–5,96)	3,8 (0,0–4,77)	0,6 (-3,30–2,79)	0,17 (-3,30–1,0)	
<sup>a</sup> Paired T-Test, <sup>b</sup> Wilcoxon Test					

**Table 3: The relationship between individual cadre characteristics and change of cadre performance score (score gain) after intervention**

Variable	Δ Knowledge score	Δ Attitude score	Δ Practice score	Δ Self Efficacy score	Δ CGM Performance score
Employment Status	0,374 <sup>b</sup>	<b>0,044<sup>c</sup></b>	0,462 <sup>b</sup>	0,416 <sup>c</sup>	0,041 <sup>c</sup>
Age (Year)	r = 0,090 p = 0,337 <sup>d</sup>	r = 0,022 p = 0,910 <sup>e</sup>	r = -0,070; p = 0,411 <sup>d</sup>	r = 0,085 p = 0,657 <sup>e</sup>	r = 0,002 p = 0,991 <sup>e</sup>
Education Level	<b>0,022<sup>b</sup></b>	0,463 <sup>c</sup>	0,208 <sup>b</sup>	0,496 <sup>c</sup>	0,538 <sup>c</sup>
Long Being a Cadre	r = -0,124 p = 0,512 <sup>d</sup>	r = 0,022 p = 0,910 <sup>e</sup>	r = -0,260; p = 0,166 <sup>d</sup>	r = 0,160 p = 0,398 <sup>e</sup>	r = 0,255 p = 0,173 <sup>e</sup>
History Following Cadre Training	0,013 <sup>b</sup>	0,424 <sup>c</sup>	0,559 <sup>b</sup>	0,617 <sup>c</sup>	0,609 <sup>c</sup>
Frequency of Cadre Training	r = -0,164 p = 0,385 <sup>d</sup>	r = 0,246 p = 0,190 <sup>e</sup>	<b>r = 0,350; p = 0,038<sup>d</sup></b>	r = -0,021 p = 0,914 <sup>e</sup>	r = 0,126 p = 0,507 <sup>e</sup>

<sup>b</sup> Mann Whitney Test, <sup>c</sup> Unpaired T-Test, <sup>d</sup> Rank Spearman Test, <sup>e</sup> Pearson Product Moment

**Table 4: Correlation (r) among change of knowledge, attitude, practice, self-efficacy, and CGM performance score**

		Δ Knowledge score	Δ Attitude score	Δ Practice score	Δ Self Efficacy score	Δ CGM Performance score
Δ Knowledge score	r		-0.021	<b>0.407</b>	-0.094	-0.085
	(p)		(0.911)	<b>(0.026)</b>	(0.622)	(0.655)
Δ Attitude score	r			0.234	0.253	-0.090
	(p)			(0.214)	(0.177)	(0.636)
Δ Practice score	r				-0.063	0.159
	(p)				(0.742)	(0.401)
Δ Self Efficacy score	r					-0.131
	(p)					(0.491)
Δ CGM Performance score	r					
	(p)					

This study proves that training is followed by mentoring on the use of WHO-Anthro software in CGM activities affected changes in cadre knowledge scores, practices, and cadre performance. It proves that with the accompaniment of continuously, knowledge of cadres would be increased. With increasing knowledge, it would also improve the ability of practice. As practice was a manifestation of an action based on the previous empowerment. With the increased practice score, then indirectly would also increase the performance of cadres Posyandu. Thus, cadres could perform the tasks in accordance with the objectives to be achieved from the implementation of Posyandu <sup>16</sup>. In the indicator of data quality and the achievement of program facilities in performance surveillance variable did not change the score of the possibility occurred because the cadres were actually experiencing confusion data processing through

the computerized system with WHO-Anthro. After being assisted, the cadres learned more about Posyandu and WHO-Anthro so they realized that facilities in their Posyandu still lacking<sup>17</sup>.

The impact of the training on improving the skills of Posyandu cadres has been widely demonstrated, that the skills of Posyandu cadres in anthropometric measurements increase after participating in training<sup>18,19</sup>.

The results of this study are similar to the findings of the study in the city of Banda Aceh<sup>18</sup>, which found the quality of information on training groups based on WHO-Anthro software after one month of training had a good improvement, especially in terms of timely, completeness, and accuracy aspects. After one month of training and the application of WHO growth standards in the treatment group based on WHO-Anthro software

showed an increase in the percentage of information quality of nutritional status data on children under five reaching 13.6%. The quality of nutritional data from trainees based on WHO-Anthro software had better effectiveness than manual-based training. This finding is reinforced by De Onis et al., The use of WHO-Anthro software can accelerate the process and increase the validity of input-output data produced, and become an important part in the assessment or monitoring of nutritional status<sup>20</sup>.

The impact of interventions on changes in cadre performance at CGM was higher found in cadres with working status than those who did not work. The cadres who work are thought to be better able to adapt and implement new applications because they have better working skills. The intervention on changes in knowledge and practice was found to be higher in cadres who previously had a history of training or more training frequency. Previous training that has been accumulated will increase more trained knowledge, insight, and skills. The link between training increased knowledge and skills has been found through this study, that changes in knowledge are positively correlated with changes in cadre practices.

In this study, training did not significantly affect changes in self-efficacy variables, and a number of characteristics of cadre characteristics were also not related to changes in self-efficacy scores. However, self-efficacy scores have proven to increase after training and mentoring. this may occur because the activity is not focused on how to improve good self-efficacy because if this process is carried out it will take longer and not less cost. Factors such as mastery experiences, vicarious experiences, social persuasion, physiological and emotional states<sup>21</sup> have not been included in the analysis. The results of this study are different from the results of research conducted on Posyandu cadres in East Java, where interventions can significantly improve self-efficacy and affective abilities<sup>22</sup>. The higher self-efficacy will have a positive effect on improving the affective ability of a cadre, and the higher the affective ability of a cadre will have an effect on increasing healthy behavior<sup>23</sup>. Increased cadre ability will have an impact on Posyandu management, especially growth monitoring and health promotion.

Training activities on the implementation of WHO-Anthro software have been proven to improve Posyandu cadre knowledge, but to improve the practice and cadre

performance need three months of assistance. This research completed evidence, that to change the pact and ability of cadres could not be done in a short time, but needed assistance. Intervention with the training model alone is not enough, it needs to be continued with field assistance that is carried out on-going.

Although training and mentoring on the use of WHO-Anthro software have been proven to be able to improve the knowledge, practice, and performance of Posyandu cadres, the intervention model has not been able to address all the issues related to cadres in the Posyandu. The cadres often change and need to be followed by training or retraining so that the technical skills of active cadre nutrition are adequate and have the ability to do “nutrition counseling and counseling” so that nutritional education activity can be run<sup>7</sup>.

## CONCLUSION

It was concluded that training and guidance on WHO-Anthro software implementation improve cadres performance and nutrition surveillance in *Posyandu*. To improve the capacity of cadre in handling the Posyandu information system, it is necessary to train and carried out the mentoring activities (in at least three months).

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**Ethical Clearance:** This study was approved by the Ethics Committee for Health Research at the Faculty of Public Health, Diponegoro University, Indonesia

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# Socio-economic Status of Families as Predictors of Stunting Phenomenon among Elementary School Students at Semarang City, Central Java, Indonesia

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## ABSTRACT

The prevalence of stunting in children is related to poverty, low education levels, and inadequate health and health services. However, in a society with sufficient income, it is not guaranteed to be free from stunting. The purpose of this study was to determine the relationship between family socioeconomic aspects and stunting in favorite elementary school children. This research was an analytic observational study with a cross-sectional design. The research subjects were 458 children from favorite primary schools in Semarang Indonesia, who were selected using simple random sampling. The dependent variable was stunting status. Independent variables were gender and age of school children, level of education, occupation, and income of their parents. Hypothesis test used Chi-square and multivariate analysis with Logistic Regression. The study found that the percentage of stunted children in favorite elementary school students was relatively low. Bivariate analysis showed there were several variables related to stunting in students, namely the child's age, maternal education and father's income. Multivariate analysis showed maternal education levels related to stunting status in children, mothers with low education risk increasing the stunting of children in favorite schools (OR = 4.65; 95% CI: 1.50-14.45). Parent factors are related to stunting in children.

**Keywords:** *mother's education, social-economic, elementary school, stunting*

## INTRODUCTION

The main component needed to implement national development are qualified human resources. Meanwhile, one of the determinants of the quality of human resources is the adequacy of nutrition. Good nutrition will produce healthy, intelligent and productive human resources. Extensive research has shown the health, economic and intergenerational consequences of stunting: higher risk of dying, poorer psychomotor and mental development and school achievement, loss of human capital and economic productivity in adulthood, increased risk of chronic diseases, and reduced maternal reproductive<sup>1</sup>.

Children in school and adolescence have growth mentally, intellectually, physically, and socially. This age group needs to get special attention. That is the most important phase to form the human resources that will hold the future of a country. When their nutritional needs are not fulfilled properly, then their mental and physical development is also not optimal. So they can not carry out the role of a leader in the future<sup>2</sup>.

One of the nutrition problems faced by Indonesian children, including school-age children, is stunting. Stunting problems in children can lead to adverse cognitive development in childhood and adolescence, fewer school years, cognition losses, and losses via reduced schooling, productivity losses and reduced adult stature<sup>3</sup>. Prevalence stunting in Indonesia has remained high over the past decade, the national level is approximately 37%<sup>4</sup>. Toddler with stunting status will have a higher risk of poor cognitive, lower educational achievement in life and can cause a problem in subsequent socio-economic, inter-generational consequences. There are three causes of stunting phenomenon in

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South Asia and in most developing countries, (1) poor feeding practice; (2) poor maternal nutrition and (3) poor sanitation. All of the causes factor related to socio-economic aspects<sup>5</sup>.

Stunting in school-age will be associated with cognitive development, low productivity and shorter stature in adulthood. Indonesian Baseline Health Research in 2010 with sample children aged 6-12 years showed prevalence stunting among school-age children in Indonesia was 35.4% was 41.6% in rural areas and 29.8% in urban areas<sup>6</sup>. Current research showed risk factors for stunting in school-aged are a number of family member, occupational, maternal education and education of the family's head<sup>5</sup>.

Based on various studies, it appears that low economic conditions, poor families and low education are always considered to be the cause of stunting. There have been no studies examining the incidence of stunting in families with good economics (sufficient income) with their children attending favorite schools.

The purpose of this study was to determined the relationship between socio-economic aspects of the family and the incidence of stunting in school-age children from the favorite primary school in Semarang, Jawa Tengah Province in Indonesia.

**MATERIAL AND METHOD**

This research is an analytic observational study with a cross-sectional design. This study was conducted on male and female students at a primary school, "SD Sendangmulyo 04", in Semarang City, Central Java Province, Indonesia. This school is a favorite school with international standard schools. The number of subjects was 458 consisting of 219 boys and 239 girls were selected with simple random sampling from grades 1 to 6. The dependent variable is stunting status. Independent variables studied include sex, age, father's education level, mother's education level, father's job, mother's job, father's income, and mother's income.

The data were collected by asking respondents with questionnaires. Data collection was conducted by 10 selected collages from the Department of Public Health Nutrition, Faculty of Public Health, Diponegoro University.

After data was collected by enumerators, it started with data editing, coding, data entry, and data cleaning.

Data were categorized (1) Categories of age <9.6 years and ≥9.6 years. (2) Stunting category (HAZ < -2SD) and not stunting (HAZ ≥ -2SD); (3) The level of education was categorized: low (never studied in high school) and high (studied in high school and or university); (4) Job status consists of: not working and working; and (5) family income per month was categorized: no income, two million rupiahs or less and more than two million rupiahs every month.

Statistical analysis of this study was carried out on a categorical scale. Data analysis was performed with IBM SPSS Statistics. The hypothesis test used in this study was Chi-square and the variable said to be related to stunting when p<0.05. Furthermore, the independent variables which had p<0.025 were included with multivariate analysis using Logistic Regression.

**RESULTS**

Based on the data presented in Table 1, it was found that a number of students who suffered stunting (7%).

**Table 1: Stunting status of children (n = 458)**

Stunting Status	Boys		Girls		Total	
	n	%	n	%	n	%
Stunting	15	6.8	17	7.1	32	7.0
No Stunting	204	93.2	222	92.9	426	93.0
Total	219	100.0	239	100.0	458	100.0

The majority of father and mother's education level was at a high level. However, the low number of educational levels on the respondents' mothers was 3.9%. The result of bivariate analysis at all subject (n=458) from this study was shown in Table 2. Variable that associated with stunting in school-age children were the age of the child (p=0.049), mother's education (p=0.005) and father's income (p=0.040). The odds ratio from that variable showed OR=2.0 (95% CI:0.94– 4.25) in the age of the child, its mean that children in <9.6 years old have a risk to become stunting twice higher than children in ≥9.6years old. Variable mother's education level showed OR=5.8 (95% CI:1.95–17.71), its mean that children who have a mother with low education will have a risk to stunting five times higher than the children who have a mother with high education. In line with the variable age of the child, variable father's income showed OR=2.0 (95%CI:0.98–4.32). Its mean that children who have a father with low income will have a risk to stunting twice higher than the children who have a father with high income (Table 2).



**Table 2: The relationship between the socio-economic status of families variables and stunting status (n = 458)**

Variable	Stunting Status				P	OR (95%CI)
	Yes		No			
	n	%	n	%		
<b>Sex:</b>						
Male	15	6.8	204	93.2	0.530	0.9 (0.46–1,79)
Female	17	7.1	222	92.9		
<b>Age (years):</b>						
< 9.6	21	9.2	208	90.8	0.049	2.0 (0.94–4.25)
≥ 9.6	11	4.8	218	95.2		
<b>Education Level:</b>						
<i>Father</i>						
Low*	2	22.2	7	77.8	0.125	3.9 (0.794–0.05)
High	30	6.7	419	93.3		
<i>Mother</i>						
Low*	5	27.8	13	72.2	0.005	5.8 (1.95–17.71)
High	27	6.1	413	93.9		
<b>Occupational Status:</b>						
<i>Father</i>						
No*	0	0.0	0	0.0	-	-
Yes	32	7.0	426	93.0		
<i>Mother</i>						
No*	23	7.6	278	92.4	0.290	1.3 (0.61–3.01)
Yes	9	5.7	148	94.3		
<b>Family Incomes:</b>						
<i>Father</i>						
Low*	13	10.9	106	89.1	0.040	2.0 (0.98–4.32)
High	19	5.6	320	94.4		
<i>Mother</i>						
No*	23	7.6	278	92.4	0.290	1.3 (0.61–3.01)
Yes	9	5.7	148	94.3		

The father’s occupation variable cannot be analyzed because all fathers work or have jobs.

So, it made the data became constant and can not continue to analyze. In this study, the variables unrelated to stunting status of the whole children were sex (p=0,530), father’s education (p=0.125), mother’s occupation (p=0.290) and mother’s income (p=0.290) (Table 2).

Multivariate analysis was performed on all respondents using variables that met the requirements, based on the results of the bivariate analysis. There were three variables that fulfill the conditions, namely age, mother’s education, and father’s income (p<0.025).

**Table 3: The result of multivariate analysis (n = 458)**

	Coefficient	p	OR	95% CI	
				Min	Max
Age < 9,6 years	0.543	0.169	1.72	0.79	3.73
Mother’s Education was low	1.538	<b>0.008</b>	4.66	1.50	14.45
Father’s Income was low	0.543	0.165	1.72	0.80	3.70
Constanta	0.567	0.315	1.76		

Multivariate analysis showed maternal education levels related to stunting status in children, mothers with low education risk increasing the stunting of children in favorite schools (OR = 4.65; 95% CI: 1.50-14.45). So, mother with low education level was the risk factor of stunting in school-aged children.

## DISCUSSIONS

The result of this research showed that incidence of stunting in one of favorite school with an international level at Semarang, Jawa Tengah Province, Indonesia are 7% with 6.8% in boys and 7.1% in girls. The previous study found that in Indonesia was 35.4% incidence of stunting at school-age children with 41.6% in rural area and 29.8% in an urban area; then 35.8% in boys and 35.0% in girls.

The results of this study indicate that the incidence of stunting in one of the favorite schools with international standards in Semarang, Central Java Province, Indonesia is 7% with 6.8% in boys and 7.1% in girls. This finding is far lower than previous studies found that in Indonesia there were 35.4% of the incidence of stunting in school-age children with 41.6% in rural areas and 29.8% in urban areas; then 35.8% in boys and 35.0% in girls<sup>7</sup>. This can happen because the group studied has a better socio-economic background, above the average Indonesian families. Other studies have proven that family socioeconomic, especially better income can prevent malnutrition in children because access to food and health services is better<sup>8-10</sup>.

In this study father's income is associated with stunting of children ( $p=0.040$ ). Stunting is generally an indicator of chronic malnutrition. Other studies show that stunting is more common in children living in poor households. The study also found that children from the poorest families were more likely to experience stunting. This may be because they lack resources to obtain adequate health and nutrition care services<sup>10</sup>. In other studies in line with this study, it was explained that socioeconomic parents influence nutritional status, while socio-economic inequalities based on per capita income or household asset-based income show an influence on nutritional status (stunting). The ratio of stunting to nutritional status (stunting) decreases sharply if the economic status is high. The decline shows that low socioeconomic status causes poor nutritional status, and a high socioeconomic status has a better nutritional

status<sup>11</sup>. This study is also in line with previous research in Jamaica explaining that stunting children came from families with low socioeconomic status, and these children were more disturbed in carrying out daily activities compared to children who were not stunting.<sup>12</sup>

In general, this study proves that in community groups with better socioeconomic status, the case of stunting in school-age children is less. These children can have a better chance of life, are not easily sick and do not experience malnutrition, so they are able to access quality education and have good intellectual abilities. Many other studies have proven the economic benefits of increasing nutritional status, including reducing infant and under-five mortality, reducing the cost of care for infants and newborns, increasing productivity due to the reduction of malnourished children and capacity building intellectual, reducing costs due to chronic diseases, and increasing intellectual benefits through improving health quality<sup>13</sup>.

The study found that age associated with stunting status, i.e. children in <9.6 years had a higher risk of stunting than children at 9.6 years. The results of other studies, there are those that show opposite results<sup>14</sup>, and some find an insignificant relationship<sup>15</sup>, depending on the characteristics of the socio-economic background of the subject of the child under study. This study was conducted on groups of children from wealthier families, at the age of 9.6 years and above, some of them (especially boys) have entered the age of growth-spurt, so they have a higher body length. It is estimated that those who were previously stunting, then at the age of 9.6 years and above become not stunting. To strengthen this evidence, further research is needed.

In this study, sex was not related to children's stunting status ( $p=0.530$ ). This shows that their families provide access to the same nutrition, not differentiated on the basis of sex. Another study found that there was no significant association with child stunting status<sup>16</sup> but some found that sex was associated with stunting, which showed that boys were more stunting than girls<sup>17</sup>, especially from lower low-income families.

Multivariate analysis shows the level of education of mothers with stunting status. In conditions of relatively adequate income levels, the level of maternal higher education determines the nutritional status of children in favorite schools. This study is similar to other studies

which show that the prevalence of stunting children in low-educated fathers and mothers is higher than those of parents who have a higher education; a low maternal education will be at risk as much as 0.76 times less nutritional status<sup>18</sup>. The results of other studies also support this study that children whose mothers have low education have a risk of 4.2 times stunting compared with children whose mothers are highly educated<sup>19</sup>.

The result of this study is the same with review study for child stunting determinants in Indonesia that find low household socioeconomic status, low maternal height and education are particularly important child stunting determinants in Indonesia<sup>20</sup>. Another study shows that a high level of maternal and paternal education were both associated with protective caregiving behaviors<sup>21</sup>. Mother is a child nutrition gatekeeper, has the greatest impact on long-term nutritional consumption of children<sup>22</sup>. Therefore, educated mothers will have sufficient knowledge about the health and nutrition of their children, the nutritional status of children can be developed through improved child care, use of health services, hygiene, and sanitation, etc<sup>23</sup>.

## CONCLUSION

The study found that the percentage of stunted children in favorite elementary school students was relatively low. This is inseparable from a better socioeconomic background and welfare of their families. Maternal education is an important factor in keeping children from becoming stunting. Mother with low education level was the risk factor of stunting in school-aged children. It is important to provide counseling to mothers about balanced nutrition for elementary school children and long-term programs from the government to increase family income. If the family has sufficient income and a good mother's education, indirectly, children's nutrition will also increase.

**Conflict of Interest:** The authors declare that there was no conflict of interest in this research.

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**Ethical Clearance:** This study used general information and there were no interventions that hurt or harm to the respondent and had obtained ethical clearance from the Health Research Ethics from the Faculty of Public Health, Diponegoro University. The availability of students to become respondents was evidenced by filling out informed consent.

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# Analysis of Physical Environment of the House as a Workplace for work-Related Complaints on the Shoe Industry Home Workers in Semarang Regency

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## ABSTRACT

Home workers at the shoe industry in Semarang Regency mostly suffer from callus (84.8%), stiff shoulder (75.8%), and headache (72.2%). This study aims to analyze the physical environment of the house as a workplace with a work-related complaint on the shoe industry workers in Semarang regency. It was an observational research with cross sectional approach. The population were all the workers in the shoe industry, Semarang Regency. The Sample for the research 66 workers taken by proportional random sampling method. Data analysis used distribution frequency, Chi-Square test and logistic regression. The results showed that there were several physical environment variables of the house that have relation with the complaints due to work with the value of  $p \leq 0.05$  such as light intensity, house ventilation, and house temperature. Multivariate analysis showed work-related complaints were influenced by variables of lighting, temperature and ventilation jointly by 93.5% and the rest influenced by other factors. The conclusion of this study was the importance of maintaining the quality of the physical environment of the house as a workplace because it can affect the complaints due to work. Shoe industry home workers should pay attention to the intensity of light, ventilation, and the temperature of the house as a place of work.

**Keywords:** *home workers, physical environment, work place, work related complaints*

## INTRODUCTION

Home-worker is a worker involved in home-based industry through a putting-out production system. According to ILO Convention No. 177 of 1996 on Home Workers, the term *home worker* means work carried out by a person, to be referred to as a homemaker: in his or her home or in other premises of his or her choice, other than the workplace of the employer; for remuneration; which results in a product or service as specified by the employer, irrespective of who provides the equipment, materials or other inputs used<sup>(1)</sup>. Home workers are classified in three groups, namely working on their behalf, working on order, and contract working. Contract workers produce the work they receive from

intermediaries or subcontractors in accordance with the specifications and time schedule stipulated by the principal<sup>(2)</sup>. There are many problems faced by home workers. The seven-country study reported occupational health and safety hazards as a major concern for the home-based workers<sup>(3)</sup>. Many home workers are overworked and must maintain unhealthy postures as an ergonomic risk relating to poor posture from sitting on the floor or at low tables (incense stick and cigarette rollers), long work hours with limited rest time; as well as exposure risks to toxic substances (incense stick rollers, shoe makers, metal workers)<sup>(3)</sup>. In Bangladesh, reported respiratory and other chronic or acute health problems. In Thailand, reported eye strain, sore eyes and blurred vision. Their workplaces have poor lighting and, particularly in the inner city areas, are often congested, hot and stuffy. Exposure to dust and other irritants, such as the pungent fumes of kerosene, results in allergies and respiratory diseases<sup>(4)</sup>. In Nepal, home workers are forced to work in candlelight due to frequent power cuts: the dim light affects the eyes and the smoke from the candles irritates the nose and throat<sup>(4)</sup>.

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Home workers mostly work in their homes that are not according to health requirements. The physical environment factors of the house and also from the production process can have an impact of health problems for workers. In Semarang city, from 146 home workers in charcoal sector identified that housing conditions of home-based workers who were not eligible: ceiling 91.1 percent; floor 57.5 percent; ventilation 42.5 percent and waste disposal facilities 97.3 percent<sup>(5)</sup>. The work complaints from the charcoal sector were 80 percent joint pain and 13.7 percent out of breath, whereas the more often work complaints were 41.1 percent muscle pain; 19.2 percent stiffness; 13 percent cough and 11.6 percent tingling<sup>(5)</sup>. Economic activity in Semarang Regency is dominated by industry sector. One of the industries in Semarang Regency is the leather shoes industry. The leather shoes industry in this study employs homeworkers in charge of sewing shoes. This study aims to analyze the physical environment of the house as a workplace with a work-related complaint on the shoe industry workers in Semarang regency.

**METHOD**

This was observasional research with cross sectional approach. Population home workers from shoe leathers industry were 80 and they spread at Bergas sub distric, Pringapus sub distric and Bawen sub district. The sample size were 66 home workers from Lemeshow formula:

$$n = \frac{Zx^2P(Q)N}{Zx^2P(Q) + e^2N}$$

α= 0.05. Sampling done by proportional random sampling from 3 sub districts from Semarang regency.

The physical environment factors of the house were include: lighting, temperature, ventilation, house wall, house floor and occupancy density. The data were collected by check list for observation the house and questioner for interview the respondent. Data analysis used by distribution frequency, Chi square and logistic regression.

**RESULT AND DISCUSSION**

All of Home workers from leather shoes industry in Semarang Regency were women. The frequency of complaints from home workers as in table 1.

**Table 1: Frequency Distribution of Work Complaints**

Work Complaints	Yes (%)	No (%)
Shortness of Breath	54.5	45.5
Headache	72.2	27.5
Eye pain	57.6	42.4
Upper back pain	60.6	39.4
Lower back pain	59.1	40.9
Stiff shoulders	75.8	24.2
Tremor	40.9	59.1
Menstrual Disorders	13.6	86.4
Callus	84.8	15.2
Nausea/Vomiting	22.7	77.3
Itching	42.4	57.6

Headache, Stiff Shoulders, Callus, Upper back pain and Lower back pain were the usually complaints from home workers. The frequency of complaints became the basic for divided in to Complex Complaints and Simple Complaints base on mean values. There were 57.6% Complex Complaints and 42.4% Simple Complaint. Home workers of shoe industries often had to pursue production time and numbers that unmatch with the terms of provisions. Workers usually had to complete up to 20 pairs of footwear within two days. Based on the results of interview, workers could finish 1 pair of footwearwithing one hour so at least the workers need to work 10 hours a day. All the workers who sewed the footwear are female. Therefore, they often had to multitask between work and household activities which certainly added to their physical and emotional burden<sup>(6)</sup>

The frequency distribution of physical environment factors of the house such as: Lighting, ventilation, house wall, house floor, temperature and occupancy density were in table 2.

**Table 2: Frequency Distribution of Physical Environment Factors**

Physical Environment Factors	Frequency (%)
<b>Lighting</b>	
Not Qualified	65.2
Qualified	34.8
<b>Ventilation</b>	
Not Qualified	68.2
Qualified	31.8

Conted...

<b>House Wall</b>	
Not Qualified	13.6
Qualified	88.4
<b>House Floor</b>	
Not Qualified	4.5
Qualified	95.5
<b>Temperature</b>	
Not Qualified	62.1
Qualified	37.9
<b>Occupancy Density</b>	
Not Qualified	15.2
Qualified	84.8

Environmental conditions of the house as a work place for home workers with the poor lighting cause

of work-related complaints, too much or too little light strains eyes and may cause eye irritation and headaches<sup>(7)</sup>. Ventilation that are not in accordance with the requirements will result in disruption to the activities of home workers who do a lot of sewing work activities in a closed house. It certainly can affect the physical condition of respondents who cause work complaints such as respiratory symptoms, asthma (shortness of breath), allergy and sick building syndrome such<sup>(8)</sup>. Environmental conditions of the house as a work place for home workers with temperatures above the Threshold Limit (NAB) can cause work complaints such as fatigue, headache, nausea/vomiting, and shortness of breath. Manual workers who are exposed to extreme heat or work in hot environments may be at risk of heat stress, especially for workers in low-middle income countries in tropical regions<sup>(9)</sup>

**Table 3: The Association between the physical environment factors of the house with Work Complaints**

Variables	p value	PR	CI 95%
Lighting	0.001	3.530	1.598-7.799
Ventilation	0.003	2.489	1.234-5.019
House Wall	1.000	0.960	0.514-1.739
House Floor	1.000	1.167	0.510-2.671
Temperature	0.046	1.707	1.012-2.882
Occupancy Density	1.000	1.050	0.603-2.828

There were association between: Lighting with work complaints, ventilation with work complaints and temperature with work complaints. Home workers had risk for work complaints 3.5 times greater if the lighting were not qualified compare with the lighting qualified in their home. Besides that, home workers had risk for work complaints 2.5 times greater if ventilation were not qualified compare with qualified ventilation. And home workers had risk for work complaints 1.7 times greater if temperature not qualified compare with qualified temperature.

**Table 4: The Logistic Regression of physical environment factor**

Variables	B	p	Adjusted OR	CI 95%
Lighting	2.491	0.001	12.076	2.905-50.205
Ventilation	1.776	0.014	5.906	1.424-24.504
Temperature	1.890	0.009	6.621	1.603-27.338
Constant	-8.754			

The multivariate analysis with logistic regression showed work-related complaints were influenced by variables of lighting, temperature and ventilation jointly by 93.5% and the rest influenced by other factors.

**CONCLUSION**

The conclusion of this study was the importance of maintaining the quality of the physical environment of the house as a workplace because it can affect the complaints due to work. Shoe industry home workers should pay attention to the intensity of light, ventilation, and the temperature of the house as a place of work.

**Conflict of Interest:** No conflict of interest for this article to publish

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# Pain, Hyperuricemia (Uric Acid), and Elderly Insomnia

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## ABSTRACT

Hyperuricemia is a result of normal metabolism from the digestion of proteins from the decomposition of purine compounds which should be removed through the kidneys, feces, sweat and urine. The accumulation of too much purine substances causes pain that occurs a lot in the age above 45 years, namely the elderly. Elderly who experience Hyperuricemia is one sign of symptoms is pain. Pain can cause elderly people who have difficulty sleeping or insomnia. Purpose of the study Analyze the relationship of pain with insomnia in elderly patients with Hyperuricemia. The design of the analytical study of correlation with the Cross Sectional approach. The population is all Hyperuricemia sufferers in the elderly in Ledok Area, Sukorejo Village, Malo District, Bojonegoro Regency using total sampling technique. Data were collected using questionnaire sheets with measuring instruments Numeral Rating Scale (NRS) and Pittsburgh Sleep Quality Index (PSQI) Questionnaire, to determine the relationship of pain with insomnia in elderly patients with Hyperuricemia. The analysis uses the Pierson test with a significance level of  $\alpha < 0.05$ . Nearly half of respondents aged 55-64 years experienced insomnia with poor sleep quality as many as 13 respondents (43.3%) experienced by female respondents as many as 12 respondents (40%) and 1 male respondent (0.3%) and some women who have a value of Hyperuricemia levels of 6-7 mg/dL with a moderate pain scale of 14 respondents (46.7%). The results of this study were that there was a relationship between pain and insomnia in elderly patients with Hyperuricemia with the results of the Pearson test obtained sig. 2 p = 0,000  $< \alpha < 0,05$ .

**Keywords:** Pain, Insomnia, Elderly, Hyperuricemia

## INTRODUCTION

Hyperuricemia is the result of normal metabolism from digestion of protein from the decomposition of purine compounds (damaged body cells) which should be removed through the kidneys, stool/sweat. Naturally, the uric acid is found in the human body and is found in all foods in living cells, namely foods from vegetables, fruits, nuts and animal origin <sup>(1)</sup>. Hyperuricemia levels that are above the normal threshold can cause pain and severe pain in the joint area. Pain is a subjective sensation, an uncomfortable feeling usually associated with actual or potential tissue damage <sup>(2)</sup>. Pain and severe pain in patients with Hyperuricemia are more common at night, this makes patients with Hyperuricemia often wake up from sleep and have an impact on the poor quality and quantity of sleep sufferers so that they experience insomnia <sup>(3)</sup>. Insomnia is the most common

disorder in adult individuals, namely, the inability to sleep based on the quality and quantity of sleep <sup>(4)</sup>. The incidence of Hyperuricemia prevalence in 2008 reported by the World Health Organization reached 20% of the world's population Hyperuricemia, where 5 to 10% are those aged 5 to 20 years and 20% are those aged 55 years. In 2015 Indonesia was ranked 4th in the world which suffered the most from urate. Hyperuricemia in Indonesia is known to affect around 35% of men over 34 years. Based on the BPS data center in East Java Province, Hyperuricemia is one of the most common diseases suffered by the elderly, namely in 2007 as many as 28% of 4,209,817 elderly suffer from Hyperuricemia <sup>(5)</sup>. The incidence of Hyperuricemia in the village of Sukorejo, Malo Subdistrict, Bojonegoro Regency was 34% with the number of elderly 91 people. The village of Sukorejo had an estimated 41 inhabitants, the area had an

elderly population of 30 people and the Kidangan village had 20 elderly people. While the prevalence of insomnia according to WHO (World Health Organization) in 2011 the world population experienced insomnia as much as 30-45% <sup>(6)</sup>. In 2004 Indonesia's population of 234.452 million as many as 28.053 million Indonesians who experienced insomnia or around 11.7% <sup>(7)</sup>. In East Java, the incidence of elderly insomnia in 2009 reached around 10% of the number of elderly people in East Java <sup>(8)</sup>. Based on the results of the preliminary study with the interview method to 12 elderly people in Ledok Area, Sukorejo Village, Malo District, Bojonegoro District, 10 elderly felt pain in the joints at night. This makes it difficult for them to start or maintain sleep/insomnia.

Factors that influence the occurrence of Hyperuricemia include genetic factors, gender, age, obesity, and consumption of high purines and alcohol. Hyperuricemia is a factor that increases the risk of kidney failure. Looking at the complex problem of Hyperuricemia, it can be concluded that if no treatment and control of Hyperuricemia is carried out it can cause complications in the body <sup>(9)</sup>. The cause of Hyperuricemia can also be seen from advanced age (further 60 years), menopause, metabolic disease, joint injury, physical stress, inflammation of the joints, deposits in joint prone, or solid bone <sup>(10)</sup>. Hyperuricemia can also be seen with symptoms or signs such as joint pain, stiffness in joints, heat in joints, swelling in the joints, and redness in joints (Gordon, 2014). The level of Hyperuricemia above the normal level is one of the symptoms that arises in the joints. In addition to pain in the joints it also has a variety of other effects including sleep disorders/insomnia <sup>(11)</sup>.

Treatment of Hyperuricemia can be done by pharmacology and non-pharmacology. However, pharmacological treatment is certainly not very effective during the treatment of Hyperuricemia, therefore treating Hyperuricemia in addition to treatment therapy must also be done with non-pharmacological therapies such as healthy diets and exercise, so that Hyperuricemia treatment can be more effective <sup>(12)</sup>. Treatment of Hyperuricemia can also use complementary treatments such as herbal therapy, nutritional therapy, progressive relaxation, acupuncture, acupressure, cupping <sup>(13)</sup>. In patients with Hyperuricemia, joint pain occurs which can cause insomnia or insomnia in the elderly. Insomnia is the inability to adequately sleep both the quality and quantity of sleep <sup>(14)</sup>. Based on the description above, the

researcher was interested in conducting a study whether there was a relationship between pain and insomnia in elderly patients with Hyperuricemia in Ledok Area, Sukorejo Village, Malo District, Bojonegoro Regency.

Pain is defined as a condition that affects a person and his existence is known if someone has experienced it <sup>(15)</sup>. According to the International Association for Study of Pain (IASP), pain is the experience of unpleasant emotional feelings due to actual or potential damage, or describes the condition of damage.

Insomnia is difficulty sleeping, sleep is not calm, difficulty holding back sleep and often wakes up early. Insomnia is the most common disorder in adult individuals, namely, the inability to sleep based on the quality and quantity of sleep <sup>(4)</sup>.

## RESEARCH METHOD

In this study the author uses the Cross Sectional Research Design, where the researcher observes or observes variables through giving a questionnaire about variable 1 and variable 2 data at almost the same time. The population is elderly who suffer from Hyperuricemia in Ledok Area, Sukorejo Village, Malo District, Bojonegoro Regency, as many as 30 elderly. This sampling uses nonprobability sampling with purposive sampling technique

## RESULT

Characteristics of Respondents Based on Special Data on Pain in the Elderly Hyperuricemia Patients

**Table 1: Frequency distribution of respondents based on pain in elderly patients with Hyperuricemia in Ledok area, Sukorejo Village, Malo District, Bojonegoro District**

No.	Pain scale	Frequency	Percentage (%)
1.	No pain (0)	0	0
2.	Mild pain (1-3)	8	26,7
3.	Moderate pain (4-7)	18	60
4.	Severe pain (8-10)	4	13,3
	Total	30	100

Based on table 1, most elderly people with Hyperuricemia sufferers experience moderate pain with a 4-7 pain scale of 18 people (60%).

**Table 2: Characteristics of respondents based on pain with Hyperuricemia levels in Ledok Area Sukrejo Village, Malo District, Bojonegoro Regency**

Pain	Hyperuricemia												Total	
	Gender													
	Male						Female							
	8-10 mg/dL		6-7 mg/dL		4-5 mg/dL		8-10 mg/dL		6-7 mg/dL		4-5 mg/dL			
	f	%	f	%	f	%	f	%	F	%	f	%	f	%
mild (1-3)	0	0	0	0	7	23,3	1	3,3	0	0	0	0	8	26,6
moderate (4-7)	0	0	4	13,3	0	0	0	0	14	46,7	0	0	18	60
Severe (8-10)	0	0	0	0	0	0	4	13,3	0	0	0	0	4	13,3
Total	0	0	4	13,3	7	23,3	5	16,6	14	46,7	0	0	30	100

Based on table 2, the distribution of respondents with pain with Hyperuricemia levels showed that the majority of women who had a Hyperuricemia value of 6-7 mg/dL with a moderate pain scale of 14 respondents (46.7%) and women who had a Hyperuricemia value 8-10mg/dL as many as 4 respondents (13.3%). Based on male sex which has a value of 4-5mg/dL Hyperuricemia which experienced mild pain as many as 7 respondents (23.3%)

Characteristics of Respondents Based on Insomnia in Elderly People with Hyperuricemia

**Table 3: Frequency distribution of respondents based on insomnia in elderly patients with Hyperuricemia in Ledok Area, Sukorejo Village, Malo District, Bojonegoro Regency.**

No.	Sleep	Frequency	Percentage (%)
1.	Good	11	36,7
2.	Bad	19	63,3
	Total	30	100

Based on table 3, most elderly people with Hyperuricemia sufferers experienced poor quality of sleep as many as 19 people (63.3%).

**Table 4: Frequency distribution of respondents based on age and sex with insomnia in Ledok Area, Sukorejo Village, Malo District, Bojonegoro Regency**

Age	Insomnia															
	Age				Total		Gender								Total	
	Good		Bad				Male				Female					
	Good		Bad		Good		Bad		Good		Bad		Good		Bad	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
45-54 years	7	23,3	0	0	7	23,3	7	23,3	0	0	0	0	0	0	7	23,3
55-64 years	4	13,3	13	43,4	17	56,7	3	10	1	0,3	1	0,3	12	40	17	56,3
65-74 years	0	0	6	20	6	20	0	0	0	0	0	0	6	20	6	20
Total	11	36,6	19	63,4	30	100	10	33,3	1	0,3	1	0,3	18	60	30	100

Test of Spearman Signed Rank: sig. p = 0,01 ( $\alpha < 0,05$ )

Based on table 4, the results of age 55-64 years experienced insomnia with poor sleep quality as many as 13 respondents (43.3%) experienced by female respondents as many as 12 respondents (40%) and 1 male respondent (0.3%), age 45-54 years have good sleep quality as many as 7 respondents (23.3%) experienced by male respondents.

Relationship between Pain and Insomnia in Elderly People with Hyperuricemia

**Table 5: Distribution of Spearman statistical tests Respondents in relation to pain with insomnia in elderly patients with Hyperuricemia in Ledok Area, Sukorejo Village, Malo District, Bojonegoro District**

Correlations				
			Pain	Insomnia
Spearman's rho	Pain	Correlation Coefficient	1.000	.750**
		Sig. (2-tailed)	.	.000
		N	30	30
	insomnia	Correlation Coefficient	.750**	1.000
		Sig. (2-tailed)	.000	.
		N	30	30

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Based on table 5, it can be obtained that N or the amount of research data are 30 respondents, then the sign value. (2-tailed) is 0,000, as in the decision-making dassar above, it can be concluded that there is a significant relationship between pain and insomnia in elderly patients with gout in Ledok Hamlet, Sukorejo Village, Malo District, Bojonegoro Regency.

**DISCUSSION**

Based on the results of the study showed that the majority of elderly people with Hyperuricemia experienced poor quality of sleep as many as 19 people (63.3%). Based on table 4, the results of age 55-64 years experienced insomnia with poor sleep quality as many as 13 respondents (43.3%) experienced by female respondents as many as 12 respondents (40%) and 1 male respondent (0.3%), age 45-54 years have good sleep quality as many as 7 respondents (23.3%) experienced by male respondents. Insomnia is the most common disorder in adult individuals, namely, the inability to sleep based on the quality and quantity of sleep (4). Sleep difficulties often occur, both at a young age or old age, and often arise with emotional disorders, such as anxiety, anxiety, depression or fear. Sometimes someone has difficulty sleeping just because the body and brain are not tired (19).

Based on table 5, it can be obtained that N or the amount of research data are 30 respondents, then the sign value. (2-tailed) is 0,000 because  $\alpha < 0.05$ , there is a significant relationship between pain and insomnia in elderly patients with Hyperuricemia in Ledok Area, Sukorejo Village, Malo Sub-District, Bojonegoro District.

The International Association for the Study of Pain (16), defines pain as an uncomfortable sensory and emotional experience associated with actual and potential tissue damage. These uncomfortable feelings are very subjective and only people who experience them can explain and evaluate these feelings (20). Pain that is felt if it is not cured will be a priority of the mind which eventually clogged up depression, because of depression there will be insomnia. Insomnia is the most common disorder in adult individuals, namely, the inability to sleep based on the quality and quantity of sleep (4). In the elderly who experience Hyperuricemia it will be difficult to start sleeping. Because the elderly are someone who is due to his age experiencing biological and physical and psychological and social changes. Aging (becoming old) is a process of slowly disappearing the ability of tissues to repair themselves/replace and maintain their normal functions so they cannot survive infection and repair the damage suffered (21)

From the results of the study, it can be found that there is a relationship between pain caused by Hyperuricemia with the results of the Spearman statistical test, which states that elderly people with Hyperuricemia will experience pain which will affect the sleep quality of respondents. Of the 30 respondents 19 respondents experienced poor sleep quality because the levels of purine substances in the body increased which caused Hyperuricemia which caused pain in the joints. The higher the value of purine substances in the body, the scale of pain will be high so that the quality of sleep is poor.

## CONCLUSION

Based on the discussion about the relationship of pain with insomnia in elderly people with Hyperuricemia sufferers it can be concluded that:

1. Most women who have a Hyperuricemia value of 6-7 mg/dL with a moderate pain scale of 14 respondents (46.7%) and women who have a Hyperuricemia value of 8-10 mg/dL as many as 4 respondents (13.3%). Based on male sex which has a value of 4-5mg/dL Hyperuricemia which experienced mild pain as many as 7 respondents (23.3%)
2. Most ages 55-64 years experience insomnia with poor sleep quality as many as 13 respondents (43.3%) experienced by female respondents as many as 12 respondents (40%) and 1 male respondent (0.3%), age 45-54 years have good sleep quality as many as 7 respondents (23.3%) experienced by male respondents..
3. Spearman's statistical test results can be obtained that N or the amount of research data are 30 respondents, then the sign value. (2-tailed) is 0,000 <0,05, it can be concluded that there is a significant relationship between pain and insomnia in elderly patients with Hyperuricemia in Ledok Area, Sukorejo Village, Malo District, Bojonegoro Regency.

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**Ethical Clearance:** Ethical clearance is not applicable for this study as it is a narrative review.

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# Inverted S Window Frame Perceived as Effective and Sustainable Mosquito/Malaria Control Device

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## ABSTRACT

**Background:** Control of mosquito-transmitted diseases had focused on bednet distribution for years without malaria eradication because it lacked positive perception as traditional window screen. The novel inverted s/o window frame (ISOWF) facilitates regular cleaning of nets but stakeholders must appraise it first.

**Method:** Hoisting/dehoisting of screens on ISOWF was demonstrated. Subjects were required to use a nine-item Likert scale and 10 willingness-to-pay units for assessment and choice between it and traditional wooden window frame (TWFF) with wooden batten attached nets.

**Results:** Of 44 respondents,  $\geq 90.9\%$  considered the channel novel, simple in design, user friendly, and effective sustainable mosquito/malaria control. Twenty one persons completely rejected the TWFF in favour of the ISOWF. The average willingness-to-pay units offered the TWFF was 1.82 units while the ISOWF had 8.18 units.

**Conclusion:** The ISOWF had attractive positive perception likely to attract its pervasive application to reduce malaria and impose behavioural changes on vectors.

**Keywords:** *Window frame; screening; mosquito/malaria control; perception; environmental management; anti-mosquito device.*

## INTRODUCTION

Parasites inconvenience hosts who suffer annoyance, injuries, irritations/diseases<sup>1</sup> or poverty.<sup>2</sup> In Sub-Sahara Africa, there is evidence of improved mosquito/malaria control following increased access to bednet.<sup>3-5</sup> However, malaria continues to persist. Recent malaria death was put at 445,000 of which 90% was from WHO African Region.<sup>6</sup> Persistence is attributed to the acquisition of resistance by vectors/parasites and poor implementation of environmental recommendations.<sup>7,8</sup> Galvin et al.<sup>9</sup> attributed low bednet usage to: family sleeping

arrangements, inconvenience, comfort, and safety. They further indicated that villagers considered nets as source of fire hazard, using them as curtains instead. Egrot et al.<sup>10</sup> provided further evidence of harm and disfigurement following fires from bednet. Its misuse/abuse appear to be alarming: as curtain/pillow/fishing tool.<sup>9,11</sup> However, Eisele et al.<sup>12</sup> contend some damaging misconceptions of bednets use in Africa are media hype. The way to go about mosquito/malaria mitigation is by recalling the rejected stone–window screen.

Walker<sup>13</sup> hoped house screening could become supported as bednets. The obstacle is their appearances. Net damages are caused by children and rodents.<sup>14</sup> They further entrap dust particles compounding the aversion. Screens must influence our community/cultural perception,<sup>9</sup> allowing the norm of cleanliness/aesthetics influence their care.<sup>14</sup> Ideal nets must not be aesthetically wanting. Researchers had risen to the challenge of vector control in house design<sup>15,16,17,18</sup> but their findings are yet to be regarded.<sup>19</sup> A recent development is the inverted s/o channel window frame (ISOWF)<sup>18</sup> which retains advantages of net removal/cleaning/replacements.<sup>15</sup>

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If the limitation of “low uptake” which is the bane of bednet is not to befall ISOWF, then appropriate caution must be taken from our experiences of massive bednet distribution for years without coming close to malaria eradication – bednet lacked all round positive perception. One of the ways to avoid such pitfalls is by ensuring that new devices against mosquitoes/malaria are assessed. The extent of this appraisal can be ascertained by scaling stakeholder’s perception. When satisfied, they become active users themselves and canvassers to sustain its use through person-to-person contacts whether or not policy makers are coerced into buying such novelty. Here, the perception of ISOWF from stake holders in housing/ public health around Nsukka is presented.

**METHOD**

Making the desired ISOWFs and hoisting nets was as previously described.<sup>15,18</sup> Two ISOWFs, one bearing louver and the other bearing sliding shutters, were respectively mounted wooden stands. The corners were not joined or covered with a piece of mosquito net to aid participants’ evaluations. Two windows with/without screens were purposively demonstrated to professionals

related to public health, town planners/building professionals and community leaders and who consented in writing to participate. They were required to use a nine-item Likert scale (Is the frame: one, novel; two, simple in design; three, easily manufactured in various sizes; four, low cost; five, durable; six, would hang any of iron, silk, polyethylene, cotton, viole, or natural netting materials thus prevent entry of mosquitoes through the window; seven, user friendly and convenient because anyone could remove the net or replace it whenever desired and therefore a sustainable mosquito/malaria control approach; eight, can be made with any of the following: iron, brass, aluminum, silver, gold, plastic; and nine, ensures that rain water will drain properly and will not constitute a problem) to express their perception of the inverted s/o channel/grip window frame by selecting one of five levels ({1} strongly disagree, {2} disagree, {3} undecided, {4} agree and {5} strongly agree) each for all the items. Participants were further required to utilize imaginary 10 willingness-to-pay units to determine their choice between the (ISOWF) and the familiar TWWF to which wooden batten was applied to fix net. Data generated were organized with IBM SPSS Statistics Version 23.

**Table 1: The 9-point Likert items and the perception levels**

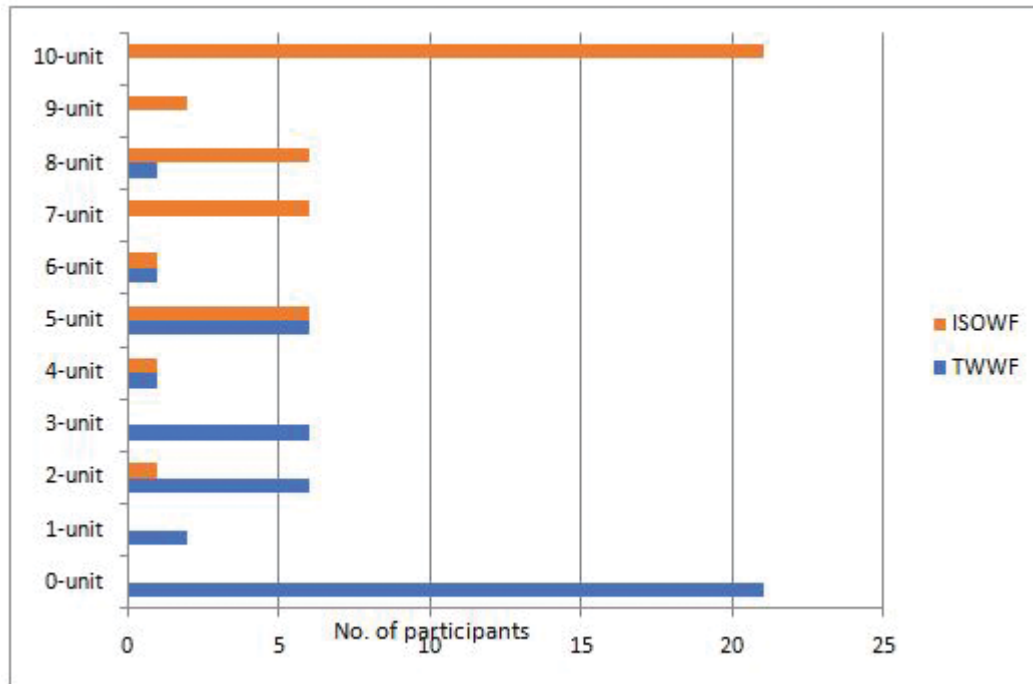
	<b>Is the frame:</b>		<b>Strongly agree (5)</b>	<b>Agree (4)</b>	<b>Undecided (3)</b>	<b>Disagree (2)</b>	<b>Strongly disagree (1)</b>
1.	Novel	# (%)	24 54.5	17 38.6	3 6.8		
2.	Simple in design	# (%)	14 31.8	26 59.1	1 2.3	3 6.8	
3.	Easily manufactured in sizes	# (%)	6 13.6	23 52.3	8 18.2	6 13.6	1 2.3
4.	Low cost	# (%)	10 22.7	19 43.2	7 15.9	7 15.9	1 2.3
5.	Durable	# (%)	20 45.5	19 43.2	4 9.1	1 2.3	
6.	Accept any kind of net/ prevent mosquito entry	# (%)	23 52.3	18 40.9	2 4.5	1 2.3	
7.	User friendly, sustainable Mosquito/malaria control	# (%)	21 47.7	20 45.5	1 2.3	1 2.3	1 2.3
8.	Made with many materials	# (%)	15 34.1	22 50.0	5 11.4	2 4.5	
9.	Drain rain water properly	# (%)	19 43.2	21 47.7	2 4.5	2 4.5	



**Table 2: Frequencies of the 9-point Likert item by sex categories (figures in brackets show percentages)**

		Likert Items								
Sex	Level	Novel	Simple Design	Easily manufactured in sizes	Low cost	Durable	Accept any net, prevent mosquitoes entry	User friendly, sustainable control	Made with many materials	Drain rain water properly
F	SD	-	-	-	1 (9.1)	-	-	1 (9.1)	-	-
	D	-	2 (18.2)	3 (27.3)	1 (9.1)	1 (9.1)	1 (9.1)	-	1 (9.1)	2 (18.2)
	U	2 (18.2)	1 (9.1)	2 (18.2)	4 (36.4)	1 (9.1)	2 (18.2)	1 (9.1)	2 (18.2)	1 (9.1)
	A	3 (27.3)	7 (63.6)	6 (54.5)	4 (36.4)	5 (45.5)	3 (27.3)	5 (45.5)	5 (45.5)	1 (9.1)
	SA	6 (54.5)	1 (9.1)	-	1 (9.1)	4 (36.4)	5 (45.5)	4 (36.4)	3 (27.3)	7 (63.6)
	Total	11 (100)	11 (100)	11 (100)	11 (100)	11 (100)	11 (100)	11 (100)	11 (100)	11 (100)
M	SD	-	-	1 (3)	-	-	-	-	-	-
	D	-	1 (3.0)	3 (9.1)	6 (18.2)	-	-	1 (3)	1 (3)	-
	U	1 (3.0)	-	6 (18.2)	3 (9.1)	3 (9.1)	-	-	3 (9.1)	1 (3)
	A	14 (42.4)	19 (57.6)	17 (51.5)	15 (45.5)	14 (42.4)	15 (45.5)	15 (45.5)	17 (51.5)	20 (60.6)
	SA	18 (54.5)	13 (39.4)	6 (18.2)	9 (27.3)	16 (48.5)	18 (54.5)	17 (51.5)	12 (36.4)	12 (36.4)
	Total	33 (100)	33 (100)	33 (100)	33 (100)	33 (100)	33 (100)	33 (100)	33 (100)	33 (100)

**Keys:** F = Female; M = Male; SD = Strongly disagree; D = Disagree; U = Undecided; A = agree; SA = Strongly agree.



**Figure 1: Bar chart shows the choice behavior of participants**

**RESULTS**

Respondents numbered 44, 11 females and 33 males. Age of respondents was the only interval data obtained, although 16 participants did not state their ages: 9 of 11 women and 7 of 33 men. The average age of females/males participants were 44/47 years respectively. Of the 28 who stated their exact ages, the range was 50 years

with minimum and maximum respectively 27 and 80 years. The overall mean was 47.68 years (confidence interval 43.50 - 51.86); modal and median number of years was 47 and therefore confirming that that age distribution had a normal curve and a proof that participants were mature adults who could influence the community. Participant’s decisions were captured in Tables 1, 2 and Figure1.

## DISCUSSION

Results exposed ISOWFs, non-toxic screen hangers housing window shutters as novel, cost-effective, simple, easily manufactured, low cost, durable and anti mosquito device that forms part of the building. The hanging processes were easy to apply so there is the likelihood that insect screens could be hoisted consistently thereby meeting the sustainability attribute of environmental management control.<sup>20,21</sup> Furthermore, it demonstrated the ability to accept many kinds of netting materials which anyone could apply without expert assistance. ISOWF could be made with many metal and plastic materials and would not retain run-off water that could engender rapid rusts and decay if the material is degradable such as iron.

Ogoma et al.<sup>21</sup> showed that the initial cost of installing window screens is comparable with that of providing bednets for all occupants. It could be argued that this innovation would tip the scale highly in its favour because any screen type or natural nets<sup>15</sup> could be applied. Over time, the cost of screening via the novel frame vis-a-vis bednet could be significantly lower. However, only further evaluations could unearth fully the cost benefits of this innovation. However, there is this attribution in the locality that any product other than farm produce is costly. This local bias notwithstanding, the majority of respondents seemed to be knowledgeable and correctly agreed with that item. The fact that a number of metal and non-metal materials could be applied in manufacturing connotes inherent ISOWF cheapness because everyone could make it with a suitable material that he considers convenient.

Since the individual provides his own home, ISOWF presents to him an opportunity to directly control vectors himself rather than relegating that responsibility to agents of government.<sup>22</sup> He avoids the suspicion inherent in socially marketed bednets.<sup>23</sup> Rather, he attains self fulfillment. The channel therefore encourage a bottom-up approach to the control of malaria vectors<sup>24</sup> and minimize abuses or misuse unlike bednets where non-use or misuse is widespread<sup>3,16</sup> and may be associated with media hype which could promote negative reactions from donor agencies.<sup>12</sup> The introduction of ISOWF along with its forebear and their future refinements would likely not place undesirable ecological selection pressures on vectors unlike those of insecticides.<sup>25</sup> Rather it could attract the use of

legislation to boost their pervasive utilization especially in Sub-Saharan Africa which account for most death due to malaria.<sup>6</sup> Governments across the globe could cash in on the new opportunities that these channels provide to redefine malaria and other vector borne diseases control in their jurisdictions.

Von Seidlein et al.<sup>26</sup> say that despite rigorous hard work to increase bednet use in many areas, uptake remains poor. Yet it is this same intervention that WHO gives priority over other barrier methods. Is it not strange that in her 2017 report, WHO<sup>6</sup> made no mention of window or house screening? WHO is consistent in her disregard for window/house screening as previous World Malaria Reports documents confirm.<sup>27,28</sup> Another recent document<sup>29</sup> maintains the same position. This neglect influence mosquito/malaria control negatively by prolonging the war because they opt for the *last line of defense and the line of most resistance* rather than the first line of defense with the least resistance: vectors ought to overcome a number of barriers before gaining access to the host. To reach in-house hosts, *Anopheles* ought to first penetrate the house: therefore, barriers around the external perimeter of the house should be the first line of defense. That is, windows/doors/ceilings/eaves and other openings in houses ought to be where *primary vector control* begin. The second line of defense would be internal boundaries of a house – where *secondary vector control* such as insecticide-treated wall lining<sup>30</sup> and wall sheeting materials impregnated with insecticides<sup>17</sup> could apply. *Tertiary control* encompasses the space between the wall and the bed – where aerosol and traps are applied. Finally, the *quaternary control*, the last barrier ought to be bednets which attract most resistance.

## CONCLUSION

The ISOWF has positive ratings in all the Likert items used to assess its perception implying that it would impact public health. Its cheap and user friendly attributes strongly position it as a sustainable anti mosquito/malaria tool with no risk of circumvention. It satisfies the requirements for meeting the attributes of environmental management control strategy in poverty ridden hot tropical countries, particularly Sub-Saharan Africa. It will create opportunities for investors, donors, governments etc. to fully activate the machineries for malaria elimination. Worldwide use will not only control insect vectored diseases but also impose

behavioral changes on malaria vectors to find alternative nutrition other man or domestic animals because of its circumvention-proof credential.

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# The Effect of Moringa Capsule and Moringa Tea Consumption on the Elderly's Uric Acid Level

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## ABSTRACT

The objective of this study is to identify the effect of moringa leaves products consumption in the form of moringa capsule and moringa tea on the elderly's uric acid level. The study design was quasi-experiment. The subjects of this study were 16 elderly which were all 47 years old or older. These subjects were divided into two groups. First, the group that was given 1 package of moringa tea (equal to 1.5g moringa tea). Second, the group that was given 2 moringa capsules (equal to  $\pm$  0.5g moringa leaves powder). Both products were set to be consumed twice a day (morning and afternoon). Both products contain antioxidant activity (IC50-DPPH) for approximately 139.93 ppm. The consumption of moringa capsule for seven days consecutively has a potential effect on the medicinal treatment of hyperuricemia by decreasing uric acid level.

**Keywords:** *moringa capsule, moringa tea, uric acid.*

## INTRODUCTION

Uric acid is the last metabolite of endogenous and purine metabolism that will be released from the human body through urine, feces, and sweat. The high intensity of uric acid in the blood (hyperuricemia) might be indicated several diseases, such as rheumatic, arthritis, cardiovascular disease, neurological disease, insulin resistance, hypertension, and kidney disease. Hyperuricemia is affected by xanthine oxidase enzyme activity. This enzyme plays an important role in purine catabolism and it has two form, they are xanthine oxidase (XO) and xanthine dehydrogenase (XDH). XDH enzyme is converted to be XO and catalyzes hypoxanthine oxidation to be xanthine and eventually become uric acid which is a major trigger for gout disease. XO was significantly and independently repair endothelial dysfunction of uric acid decrease<sup>1</sup>.

Natural polyphenol compound that is contained by several plants is able to be used as xanthine oxidase inhibitors (XOIs) to inhibit the synthesis of uric acid<sup>2,3</sup>. One of the plants which containing polyphenol compounds is *Moringa Oleifera*. *Moringa oleifera* Lam. is a species of the Moringaceae family that is well known for its varied medicinal uses and high nutritional value. *Moringa Oleifera* (*kelor* in Indonesian) is deemed to have an ability in curing various diseases due to its content, they are secondary metabolites such as tannin, saponin, alkaloid, flavonoid, phenol, and glycoside<sup>4,5</sup>. This study reported that there was a decrease in the wistar rats' uric acid levels when moringa tea with quersetin 10 mg/kg was given to the rats for 14 day<sup>6,7</sup>. Scientific studies regarding moringa product consumption mostly use animals as their subject, and there were still limited numbers that observe human.

## MATERIAL AND METHOD

This study was used quasi-experimental design. This study was conducted in two steps. First, initial study (antioxidant analysis) and main study (moringa leaves product intervention). The main materials that was used in this study were moringa leaves powder and tea which were obtained from *Moringa oleifera* Garden (The property of *Pusat Penelitian dan Pengembangan Moringa oleifera* –Moringa Oleifera Research and

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Development Center in Blora, Central Java). The antioxidant analysis used DPPH and spectrophotometry. Subject's inclusion criteria in this study were: 1) The member of Posbindu Cikarawang which are 47 years old or older, 2) hyperuricemia, 3) Physically independent, indicated by being able to walk 20 steps without any help, 4) Willing to participate and sign the informed consent. Subject's exclusion criteria in this study were: 1) Currently participating in the other study, 2) Routinely consumes antioxidant supplement and/or phytopharmaca, 4) Routinely consumes drugs which decrease uric acid level. These subjects were divided into two groups. First, the group that was given 1 package of moringa tea (equal to 1.5g moringa tea). Second, the group that was given 2 moringa capsules (equal to ± 0.5g moringa leaves powder). Both products contain antioxidant activity (IC50-DPPH) for approximately 139.93 ppm every day for 14 days. Uric acid level measurement used Easy Touch® II Blood Uric Acid

Test Strips as its tool. Data processing and analysis were done using Microsoft excel 2013 and SPSS 16 program. To identify the difference between uric acid level before treatment and after treatment, this study used paired-test. Meanwhile, to compare control groups in the study, ANOVA test was used.

**RESULTS**

**Antioxidant Activity:** Moringa leaves capsule contains chemical compounds which are quite various. Moringa leaves tend to have different content of chemical compounds which is depended on the origin area of the leaves (whether it is sub-tropical or tropical area)<sup>1</sup>. Moringa is deemed to be natural antioxidant<sup>2</sup>. This study's result demonstrated that antioxidant IC50-DPPH on both forms of moringa product was 139.93 ppm.

The Effect of moringa leaves products on subject's uric acid level

**Table 1: Subject's uric acid level during pre, mid and post-treatment**

Uric acid	Treatment Group			p2)
	Control (n = 8)	Capsule (n = 8)	Tea (n = 8)	
	Mean ± SD (mg/dL)	Mean ± SD (mg/dL)	Mean ± SD (mg/dL)	
Pre-treatment day-0	10.03 ± 1.50	10.21 ± 1.27	10.65 ± 1.06	0.017
Mid-treatment day -7	8.79 ± 0.98	8.46 ± 0.92	8.71 ± 1.06	0.00*
Post-treatment day-14	8.26 ± 0.85	7.42 ± 1.11	6.87 ± 0.48	0.00*
Δ day-0 to day-7	1.24 ± 0.61	1.75 ± 0.91	1.46 ± 0.75	
P <sup>1)</sup>	0.001*	0.001*	0.001*	
Δ day-7 to day-14	0.52 ± 0.33	1.03 ± 0.59	2.00 ± 0.75	
P <sup>1)</sup>	0.003*	0.002*	0.000*	
Δ day-0 to day-14	1.76 ± 0.78	2.78 ± 0.49	3.46 ± 0.86	
P <sup>1)</sup>	0.000*	0.000*	0.000*	

\*significant p<0.05; p1) Paired-samples T test; p2) Anova

During the period of treatment, blood sampling was undergone once in seven days. In the initial measurement (day-0), subject's uric acid level was 10.32 mg/dL. Uric acid levels test result demonstrated that 18 subjects were categorized hyperuricemia. Based on the result of paired-test, during Day-0 to Day-7 treatment, all groups that were given moringa capsule, moringa tea, and the control group experienced a significant uric acid level decrease (p<0.05). Paired test result of day-7 to day-14 demonstrated that treatment groups for both moringa capsule and moringa tea experienced a significant uric acid level decrease (p<0.05), meanwhile, control

group's uric acid level remains stable (p>0.05). Paired-test result of Day-0 to Day-14 indicated that all groups (a group that was given moringa capsule, a group that was given moringa tea, and control group) experienced a significant uric acid level decrease (p<0.05). The uric acid level difference (table 10) between day-0 and day-7 measurement (Δ uric acid level) of the control group and moringa tea group was the highest, while moringa capsule group experienced a lower decrease. Uric acid level decreased for all treatment groups. This result demonstrated that there was a possibility of allopurinol, moringa capsule, and moringa tea to be able to inhibit

uric acid level increase. ANOVA test-result in the initial measurement (day-0) indicated that there was no significant uric acid level difference between groups ( $p>0.05$ ). ANOVA test result between groups of Day-7 to Day-14 indicated a significant decrease ( $p<0.05$ ). Based on the advanced test (Duncan test), uric acid level of the control group (allopurinol), moringa capsule and moringa tea of day-7 to day14 was significantly different. This result indicated that the consumption of moringa capsule and moringa tea ( $p < 0.05$ ) significantly decrease uric acid level compared to the control group. Overall, all groups demonstrated uric acid level decrease, however, the consistent uric acid level decrease was only demonstrated by the group which was given moringa tea.

## DISCUSSIONS

Hyperuricemia is the major biochemical cause of gout which is linked with several chronic diseases, such as obesity, hypertension, coronary heart disease, diabetes, and kidney injury<sup>7</sup>. Studies regarding hyperuricemia pathogenesis inhibitor effectivity and medicinal treatment tend to be linked with several focuses, they are: a) Hyperuricemia pathogenesis depends on the enzyme in the purin metabolism and kidney transporter uric acid<sup>8</sup>; b) xanthine oxidase<sup>9,10,11</sup>; c) transport protein regarding uric acid metabolism in the kidney, several of them contributes to the uric acid reabsorption, such as URAT1, ABCG2 and GLUT9, several of them are protein secretion, such as OAT1 and UAT<sup>10,11,12,13,14,15,16,17</sup>. URAT1 is an important transport protein for uric acid reabsorption in the kidney<sup>18</sup>. Natural polyphenol compound contained by several kinds of plants is able to be used as xanthine oxidase inhibitors (XOIs) to inhibit uric acid synthesis<sup>2,3</sup>. Polyphenol compound is able to inhibit expression and extrication of several inflammations and proteolytic enzyme, different transcriptional factor activity, and reactive oxygen species production by *in vitro*. Studies on the animal models' rheumatoid arthritis, osteoarthritis, and uric acid demonstrated a decrease in tissue damage and uric acid level<sup>19</sup>. Antioxidant and flavonoid in plants that are partially linked with oxidative stress modulation were able to be an alternative medicinal treatment for hyperuricemia disease since it inhibits the activation of xanthine oxidase<sup>20</sup>.

Phenol, flavonoid, and antioxidant had a significant double effect on the antidote of free radicals and is potentially act as an inhibitor of xanthine oxidase to

lessen the effect of hyperuricemia<sup>21</sup>. In the experiment of wistar rats with hyperuricemia, antioxidant and flavonoid did not only press the high uric acid level and xanthine oxidase level but also managed the factor level which linked with oxidative stress, especially in the liver. Moringa capsule and moringa tea are able to be a candidate of medicinal treatment for hyperuricemia because it inhibits xanthine oxidase activation, which is partially linked with its modulation of oxidative stress. Allopurinol is a drug that is mainly used to decrease xanthine oxidase and uric acid level serum<sup>22,23</sup>. Moringa capsule and moringa tea which is consumed every day for 14 days consecutively have a potential to inhibit XOD in the hyperuricemia medicinal treatment. As much as 1.5 g moringa powder capsule 3 g moringa tea contains the equal amount of antioxidant which is 139.93 ppm. This is supported by the study of *In vivo* and *in vitro* experiment on the wistar rats, indicated that moringa leaves decreased wistar rat's uric acid serum, inhibited liver's XOD and adjusted it with mRNA transcription in the transporter of kidney's uric acid URAT1, GLUT9, OAT, UAT and ABCG2 to be normal in the transcription level. In the liver's purin metabolism, xanthine and hypoxanthine is oxidized into uric acid by XOD<sup>24</sup>. The experiment of moringa tea consumption for wistar rats, the effect was demonstrated by significantly inhibiting XOD activity<sup>25</sup>. Liver's enzyme activity (XOD and ADA) and kidney's mRNA expression of genes (GLUT9 and URAT1) was analyzed to further identify the mechanism that leads to hypouricemic effect<sup>26</sup>. Xanthine and hypoxanthine are oxidized to be uric acid by XOD which is happened in the liver. This fact indicated that moringa tea's hypouricemic effect is based on the inhibition of XOD activity. The increase of ADA activity leads to the increase of xanthine and hypoxanthine in the body and causes cytotoxicity<sup>24</sup>. Besides that, the decrease of activity which is able to increase anti-inflammation effect in the body<sup>27</sup>. Tea is able to prevent ADA hepatic activity until the certain limit for the hyperuricemic rats. Two kinds of tea in the certain dose is not only able to decrease the forming of xanthine and hypoxanthine, inhibit ADA activity, and eventually decrease uric acid level in the body, but also help to increase body's anti-inflammation ability<sup>28</sup>.

## CONCLUSION

The consumption of moringa capsule and moringa tea for seven days consecutively has a potential effect on the medicinal treatment of hyperuricemia by decreasing

uric acid level. Meanwhile, the consumption of moringa capsule and moringa tea for fourteen days consecutively has a potential to significantly decrease uric acid level.

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**Conflict of Interest:** Nil

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# Testing Correlation between Satisfaction of Work Related Basic Needs and Job Engagement: A Study among Teaching Staff of Engineering Colleges in Erode

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## ABSTRACT

The Objective of this study is to analyse the correlation between Job Related Basic Need Satisfaction and Job Engagement. The sample data for this research was obtained from a Total of 284 Teaching Faculty who are working in various engineering colleges in Erode District.

In this study two scales were used as Questionnaires one is Work Related Basic Need Satisfaction (W-BNS) and the other one is Utrecht Work Engagement Scale (UWES). The results from this Research study were analyzed using multiple regression analysis and Pearson Product moment correlation coefficient analysis. The analysis revealed that the various sub parameters of Job Related basic needs satisfaction have a strong correlation with the level of Job engagement.

The Results of this research findings should be utilised by the managements of the colleges to introduce various innovative measures to improve the parameters related to working conditions of the teaching staff which improves the basic need satisfaction parameters like competency autonomy and relatedness ultimately leading to higher levels of Job engagement.

**Keywords:** *Need Satisfaction, Job engagement, Competency, Autonomy*

## INTRODUCTION

Various researches have clearly proved that satisfaction of psychological needs is very important for people's levels of engagement, motivation levels and happiness (Gagne et al 2005)<sup>1</sup>. Satisfaction of needs has a closer correlation with increased job performance, lesser perception of mental and emotional stress and lesser job turnover thinking. Also when the basic needs are unsatisfied there will be higher negative psychological impact on the person ( Gagne et al 2005)<sup>2</sup>.

Satisfaction of Basic needs has a very close connection with Self Determination Theory( SDT). Self Determination Theory describes the following are the basic psychological needs – Competence, Autonomy and belongingness (relatedness).

Autonomy in the work context points out to the degree or level of freedom and discretion allowed to an employee over their work. Belongingness is the need to be an accepted member of a group. Competency

is defined as the capability to apply a set of related knowledge, skills, and abilities to successfully perform various tasks in a defined work setting.

Several empirical studies have found out that satisfaction of basic needs are associated positively with an persons optimal functioning with respect to various factors like well-being, attitudes and behavior (Deci & Ryan, 2000)<sup>3</sup>.

In Respect to the work and organizational context the basic needs satisfaction has been positively related to employees well being (eg Lynch, Plant & Ryan, 2005)<sup>4</sup>, Job Satisfaction (Ilardi, Leone, Kasser and Ryan 1993)<sup>5</sup>, Intrinsic and autonomous work motivation (Gagne 2003;Kasser Divey & Ryan 1992)<sup>6</sup> and Performance Evaluation( Baard, Deci and Ryan 2004)<sup>7</sup>.

Work Engagement is defined as a positive state of mind which leads to positive work related outcomes which is manifested by Vigor, Dedication and absorption(Schaufeli, Salanova, Gonzalez-Roma, 2002 Pg 74)<sup>8</sup>.

In nut shell work engagement defines how employees perceive their job as stimulating and energetic for which they really feel the need to allocate time and effort (the Vigor Component); as a significant pursuit (dedication) and are fully involved on something which they fully concentrate (absorption). This research studies clearly points out that satisfaction of the individuals basic psychological needs could be a major predictor of the teaching faculty job engagement which would drive them to achieve good to great job performances at the college. The researcher found out that there are very few researches that have studied and analysed in depth the correlation between job related basic need satisfaction and Job engagement.

**Aim and Importance of this Study:** India's Higher Education system is the one of the world's largest in terms of students, next only to china and the United States. India's Higher education sector has witnessed a high rate of growth in the number of Universities/University Level Institutions & Colleges since Independence.

Some of the challenges faced by these institutions are Enrollment, Quality, Infrastructure, Faculty, Accreditation, Research and Innovation. Among these factors Quality of teaching is a very important factor affecting the education institutions.

The aim of this research is to thoroughly analyze the correlation between various factors of Job related basic need satisfaction and Job engagement.

Previous studies on the construct of the relationships between Job related basic need satisfaction and engagement mostly focused on organizational domain (Imamoglu & Beydogan, 2011)<sup>9</sup>, (Babcock - Roberson & Strickland 2010)<sup>10</sup>; (otken & Erben, 2010)<sup>11</sup>, (Van Den Broeck et al, 2008)<sup>12</sup>; (Bakker & Bal, 2010)<sup>13</sup> and very rarely on the educational sector.

The Researcher came across only one research that examines work related basic need satisfaction and job engagement in educational domain done in turkey (Work Related Basic need satisfaction as a predictor of work engagement among academic staff in turkey By Fatos Silman August 2014).

Since Studies done on the correlations between the above mentioned variables in the higher education context in india are very less the researcher strongly feels that the below study will make a meaningful contribution to the existing literature.

## **DATA COLLECTION**

The Sample Size was 284 teaching Faculty from various engineering colleges in Erode. The Age of the participants ranged from 25 to 62. The age averaged to 38.57. As Regarding the internal designation status of the teaching faculty 189 of them were assistant Professors, 66 of them were associate professors, 23 of them were professors, 6 of them were senior professors.

**Data Collection Instruments:** Two scales were used one is the Work Related Basic Need Satisfaction Scale (W-BNS). This measurement scale was developed by Van den Broeck. This measurement scale has 18 items and is a 5 Point Likert Type. W-BNS has three Sub dimensions the competency need, relatedness need and autonomy need. There are items which need to reverse coded in the scale.

The competency need subparameter implies that the individual feels himself or herself competent at work (eg: Sample Item: Most days I feel a sense of accomplishment from working).

The relatedness need subparameter implies peoples need to have a sense of belonging with others and avoiding isolation at work (eg: Sample Item: The People at work care about me).

The Autonomy Need Subparameter is related to individual's capacity to make decisions at work without any coercion (Sample Item: I feel like I can Pretty much be myself at work).

The Instrument Scale (W-BNS) was tested for its validity using Person's Product Moment Correlation Coefficient using SPSS. The sample size chosen for this validity was 29. All the items in the questionnaire had pearsons correlation value greater than the value calculated from the r Table. Value of r is defined by the formula  $DF = n - 2$ , where n is the no of observations. In this case value of r calculated from table of critical values for Person's r was 0.355 (level of significance alpha was 0.05 and 2 tailed test was used)

The reliability of the Instrument (W-BNS) was measured by using computing Cronbach alpha using SPSS. The Values of the Cronbach alpha was 0.807 thus proving the instrument is reliable.

The second scale used is the Utrecht Work Engagement Scale (UWES). The UWES Scale was developed by

Schaufeli, Salanova, Roma and Bakker (2002) to measure the level of work engagement among employees.

UWES is a 17 item, 5 point Likert Self Report type of scale. The Items are scored as 0 Never, 1 Almost Never, 2 Rarely, 3 Sometimes, 4 Often, 5 Very Often, 6 Always. Higher the scores from this scale higher the work engagement. This scale has three subdimensions Vigour, Dedication and Absorption.

The Questionnaire Instrument (UWES) was tested for its validity by using Pearsons Product. From the test the Following values were obtained.

The Instrument Scale (UWES) was tested for its validity using Person’s Product Moment Correlation Coefficient using SPSS. The sample size chosen for this validity was 29. All the items in the questionnaire had pearsons correlation value greater than the value calculated from the r Table. Value of r is defined by the formula  $DF = n - 2$ , where n is the no of observations. In this case value of r calculated from table of critical values for Person’s r was 0.355 (level of significance alpha was 0.05 and 2 tailed test was used)

The reliability of the Instrument (UWES) was measured by using computing Cronbach alpha using SPSS. The Values of the Cronbach alpha was 0.907 thus proving the reliability of the instrument.

### DATA ANALYSIS

The Following Statistical procedures are used to analyze the work engagement. Descriptive analysis, pearsons product moment correlation coefficient and multiple regression analysis are used in the study.

The dependent variable in this research is work engagement and the independent variable is work related basic need satisfaction with subdimensions of “competency need”, “relatedness need” and “autonomy need”. The correlation among the variables was estimated using pearsons correlation coefficient. Multiple Regression analysis was used to find out to what levels the independent variable affected the dependent variable. Descriptive statistics was used to analyze the variables in this research study.

### RESULTS

**Table 1: Descriptive statistics for the Independent and Dependent Variables**

N = 284

Variables	Min	Max	Average	SD
The Need of Competency	2.83	6.50	4.8248	0.89422
The Need of relatedness	2.25	6.13	4.8301	0.96760
The Need for Autonomy	1.71	6.29	4.2784	0.87263
W- BNS Total	2.80	5.95	4.644	0.7299
Engagement at Work	1.88	5.94	4.5354	0.97144

From the above table we can see that the lowest mean score for the need of competency sub-dimension is 2.83 and the highest mean score is 6.50. The average mean score of the subscale is 4.824 and SD is 0.894, regarding the Relatedness need subparameter the lowest mean score is 2.25. The highest mean score of the subscale is 6.13.

The average mean score of the subscale is 4.830 and SD is 0.967, regarding the Autonomy need sub-parameter is the lowest mean score is 1.71. The highest mean score of the subscale is 6.29. The average mean score of the subscale is 4.27 and SD is 0.872 with respect to the W-BNS Total the lowest mean score is 2.80. The highest mean score of the subscale is 5.95. The average

mean score of the subscale is 4.64 and SD is 0.729, regarding the Engagement at work the lowest mean score is 1.88. The highest mean score of the subscale is 5.94. The average mean score of the subscale is 4.53 and SD is 0.971

**Table 2: Correlations between Need of Competency, Need of Relatedness and Need for Autonomy**

Variables	1	2	3	4
The Need of Competency	1	0.432	0.539	0.479
The Need of relatedness		1	0.400	0.565
The Need for Autonomy			1	0.613
Engagement at Work				1

N = 284, \* p<0.001

From the above table we can see there is a significant and a positive correlation ( $p < 0.001$ ) with respect to the above four factors.

The correlation was highest between need for autonomy and engagement at work (Correlation coefficient ( $r$ ) = 0.61) which indicates that there is a positive association between these two factors at 0.001 significance level.

**Table 3: Multiple Regression analysis to find out the level of Job engagement**

Variable	B	SEB	Beta	t	P
The Need of Competency	0.110	0.160	0.101	0.686	0.000 *
The Need of relatedness	0.357	0.136	0.355	2.626	0.000*
The Need for Autonomy	0.463	0.161	0.416	2.873	0.000*

$R = 0.710, R^2 = 0.504, F = 11.856, P < 0.001$

Please note B is Unstandardized Coefficient, Beta is Standardized coefficient and SEB is Standard Error of Beta.

Multiple Regression analysis was done to find out to what levels job related basic need satisfaction along with the sub-factors of need of competency, the need of relatedness and the need for autonomy predicted the level of job engagement.

From above table, it can be very clearly seen that the various sub-dimensions of the work related basic need satisfaction affect the level of job engagement very significantly.

$R = 0.710, R^2 = 0.504$

Analysis of Variance ( $F$ ) = 11.856  $P < 0.001$

If we evaluate the variables one by one Autonomy need was the strongest predictor of work engagement ( $\beta = 0.416, p = 0.000$ ). The next was relatedness need ( $\beta = 0.355, p = 0.000$ ). Finally competency need ( $\beta = 0.101, p = 0.000$ ) had the least impact on work engagement.

We can infer from the table 3 that the three sub-dimensions of work related basic need satisfaction accounts for 50.4 % variation in job engagement.

The regression analysis was tested for multicollinearity using (Variance Inflation Factors).

Correlation between the independent variables is called multicollinearity. Some multicollinearity is ok however excessive multicollinearity can be a problem.

Variance Inflation factor (VIF) identifies correlation between independent variables and the strength of that correlation.

Using Statics software (SPSS) we calculate VIF for each independent variable. VIF's start at 1 and have no upper limit.

**Table 4: Calculation of VIF for each independent variable**

VIF	Correlation Strength
1	No Correlation
Between 1- 5	Moderate Correlation
5	High Levels of Correlation

**Table 5: Assessing level of Multi-collinearity using VIF**

Variables	VIF Value
The Need of Competency	1.529
The Need of relatedness	1.292
The Need for Autonomy	1.481

We can clearly infer from the above table that for all the three variables the VIF Value is less than 5 indicating very less level of Multicollinearity

## RESULTS AND CONCLUSION

This study researches as to know to what level satisfaction of basic needs affects job engagement among Teaching Staff. The results clearly indicates that there is a strong positive correlation between the independent variables “competency need”, ”autonomy need” and “relatedness need” and the dependent variable job engagement.

University’s should take a lot of steps to improve their quality of assurance system by implementing measures like “greater institutional autonomy”, “hiring of staff, student admission, budget and quality of syllabus.

The researcher believes that for academic staff at various engineering colleges in Erode District to be more efficient and to have better work engagement they should be motivated and their work related basic needs should be satisfied.

Since this research explores the correlation between the satisfaction of basic needs and Job engagement in the domain of Higher Education Institution it could be very clearly said that from this study that the satisfying the basic psychological needs is the key to Job engagement.

The statistical tool multiple regression analysis used in this in this research clearly shows that any variations in the need for competency, the need for autonomy and the need for relatedness had a positive influence on the job engagement of the faculty.

The results of this research present important findings for the college administration since these three dimensions are statistically significant and create a positive impact on Job engagement among the teaching faculty.

Upper Management should carefully plan and should implement well thought out measures to improve and enhance the working conditions of the teaching staff which are very closely associated with need for competency, need for autonomy and need of relatedness among teaching staff.

This will create better efficiency for the colleges due to increased levels of job engagement among the teaching faculty and they become proactive participants.

Limitations of this study and Directions for Future Research

This study was carried only with teaching staff, Non teaching staff, office staff and management staff could also be included for future studies. This study could be done in multiple universities across multiple locations in tamilnadu and this can be compared with the present study. This study also can be replicated in organizational settings. Furthermore variables like employee turnover burnout and individual personality can be analyzed together along with variables of basic psychological needs and job engagement.

**Ethical Clearance:** Taken from Research and Publication Cell Bannari Amman Institute of Technology

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# Online Marketing - Study on Customer Satisfaction and Relationship

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## Abstract

Online advertising gives moment information about the item that we have to purchase and satisfy our everyday needs. The propensity for surfing the clients' survey in the online networking is presently multi day's normal highlights among the adolescents. The sharing of item exhibitions in the informal organization is urged by the advertisers to comprehend their clients' fulfilment and additionally to know whether any trap is seen by the client. This will assist the maker with modifying/enhance the item likewise. The more general society connection the advertiser had with their clients will reflect in enhanced consumer loyalty, when clients audits were certain at that point rehash deals and new deals will extend exponentially. Presently, the general population in littler towns in India can approach purchase quality items and administrations like what individuals in the bigger urban communities approach through web based showcasing. It is evaluated around 60% of online customers would originate from past the main eight vast urban areas<sup>1</sup>. After the passage of JIO web supplier, rivalry turned out to be more increased and now clients can get to an enormous measure of information in reasonable expense. This expansion in web infiltration has extended the potential client pool and for the most part among Gen Ys<sup>2</sup>. Additionally, their simple winning limit offered opportunity to purchase their everyday necessities all alone form and satisfy their fantasies. Presently, they feel exceptionally advantageous to shop on the web, since it liberates them from specifically visiting to the store and uses their valuable time in some other fascinating occupations. It is the obligation of the advertisers to give the important item data to these surfers and have balanced contact to build open connection with them to support their business change proportion.

**Keywords:** Online marketing, Targeted customer, Customer satisfaction, Customer relationship.

## Introduction

Web based advertising is an arrangement of instruments and techniques used to showcase items and administrations through web. Through the web we can manage the obscure essences of clients whom we have never met face to face to convey and associate flawlessly. Showcasing is the way toward advancing the items/administrations to the required/directed clients<sup>5</sup>. To distinguish these required/directed clients, enhancing Public Relations (PR) with shoppers is one of the require activity. Devices like sites, email, web-based social networking, web investigation, web indexes, and internet promoting are simply advertising emotionally supportive networks that assistance to assemble and

keep up connections and in this manner make deals<sup>3</sup>. For rousing web based advertising, web/Wi-Fi associations may be available 24 x 7 in all spots with no obstruction in signs and ought to be given essentially less expensive than the overwhelming expense<sup>5</sup>. On the other hand, online advertisers may offer the remote web either free of expense or considerably more affordable; this will grow the turnover of web based promoting into multi overlay and makes our regular daily existence ease. Web based Marketing has unlimited chances and tremendous open space; consequently there is a place for everybody on the web. At the point when think about the developed nations, use of online marketing in India is still in the beginning time.



### **Online Marketing:**

Ideal web based showcasing can't happen without clients. Individuals don't plan to flop, yet they neglect to design appropriately. The critical step is the reasoning. Take in the privileged insights of site that serves and backings the client to change over their visits in to effective deal. Web based Marketing gives mindfulness and draws in the clients to satisfy their requirements. You can have the best administration or item on the planet, however in the event that it isn't known to the planned clients, what is the point? Mindfulness can originate from numerous sources like publicizing, inquiry advancement, referrals, web based advertising, customary promoting, informal showcasing<sup>6</sup>. In these online days "Expression of mouse showcasing source is a lot quicker reach than all other promoting sources". Correspondence is a basic segment of showcasing. It makes constructs and continues connections and all relationship lighted with an important association with trust factors. Advertising is tied in with adjusting before offering. Client benefit brings new deals to a close and develops rehash deals. You have to grasp the new idea of individuals to individuals relationship-driven promoting. We are living in a period crunched society that is dependent on prompt delight. Web based advertising serves this "I need now" outlook individuals. The web is the way to prompt data and wish satisfaction.

### **Online Marketing Strategies:**

Web based promoting technique fabricates organization's notoriety and introduction online by utilizing an assortment of web apparatuses and arrangements. A site gives an online nearness that enables clients to think about your organization, administrations offered and items that you offer<sup>6</sup>. Through internet advertising the organization name is presented to open. Presently multi day substantial number of potential clients search for data in the web amid their relaxation time. Buyers today are more cognizant and enabled. They have to know, as and trust before they purchase. Put resources into advertising that bolsters pulling in, creating, and holding connections and it will be a speculation that conveys an association for a considerable length of time.

### **Various tools used in online marketing:**

You can develop your own website and display your details in it. Search engine marketing (SEM), is

the process and strategy of getting website exposure online with keywords related to your business. SEM includes pay per click (PPC) and search engine optimization (SEO)<sup>4</sup>. Pay per click is an advertisement that shows on web crawler result pages. The sponsor pays when the promotion is clicked by the client and is coordinated to their site or greeting page. PPC takes into consideration about quick introduction on the web and can give abnormal state cost straightforwardness. You can likewise publicize your organization, site, and administrations through long range interpersonal communication pages. A noteworthy reason that ads and substance on person to person communication sites help build up your organization through verbal. It enables you to utilize notoriety administration techniques, draw in with clients and answer questions. By drawing in with your clients, you urge them to share their encounters in the system. Web based showcasing methodologies incorporate email advertising too. Organizations utilize this device to contact current clients by conveying pamphlets, coupons or instructive messages. You can likewise urge new clients to agree to accept your pamphlet or mailing rundown to take in more data about the items or administrations that you give. A site is the present distributing stage, so you are what you distribute. Blogging is one of the most effortless approaches to begin building validity and increment perceivability<sup>7</sup>. Web examination apparatus knows indispensable data about how utilizing the craftsmanship and study of investigation can help business. Content showcasing delivers how to catch eyeballs with substance.

### **Benefits of online marketing:**

- 24 by 7 accessibility of data, deals, item bolster, Worldwide perceivability and Direct deals (no requirement for a customer facing facade)
- Targeted showcase (finding and serving individuals who need particular items and administrations with a tick of their fingertips)
- Competitive favourable position (to open new markets, save money on working costs, go out on a limb, get found quicker, associate better and serve/offer harder)
- Customer securing and maintenance are ease in web based promoting than conventional showcasing to pick up and keep clients.

- Savings in expense and HR (computerizing forms, utilizing the web to answer clients' inquiries, streamlining request handling)
- Immediate following to quantify, streamline and burn through cash where it really matters.
- Growth in potential, Reduced costs, Elegant interchanges, Better control, Improved client benefit, and Competitive favorable position
- Low costs: Large gatherings of people are reachable at a small amount of customary publicizing spending plans, enabling organizations to make engaging customer advertisements.
- Flexibility and accommodation: Consumers may research and buy items and administrations at their relaxation time.
- Analytics: Efficient measurable outcomes are encouraged without additional expenses.
- Multiple choices: Advertising instruments incorporate pay-per-click publicizing, email promoting and neighbourhood seek reconciliation (like Google Maps).
- Demographic focusing on: Consumers can be demographically focused on substantially more adequately in an online as opposed to a disconnected procedure.
- Online advertising is a basic piece of maintaining an effective business in the present computerized world.

### **Methodology**

To know the customers' view, an objective type of questionnaire was prepared and distributed to them who had minimum two online purchasing experiences. The questionnaire was handed over and collected the filled questionnaire personally. The objective of this study is to find out the customers experience regarding their day to day online shopping experience, customers' satisfaction and relationship with the marketers' w.r.t different aspects of online marketing. The questionnaire provides the customer an opportunity to express their views and concerns which they face on a regular basis while buying through online. This study will help the marketers to

identify the challenges affecting buying behaviour of online customers and to identify the areas where these marketers need to formulate the future policy that further helps in customer retention. The survey reveals a number of interesting facts when we interviewed the respondents. Selected customers in tier II cities namely Madurai, Tiruchirappalli and Coimbatore in Tamil Nadu were the respondents. Let us analyze few responses, which can be taken as a strong indicator for awareness of online marketing, its popularity over time and customers satisfaction/perception towards it.

### **Objectives of the study**

General objectives of this research are to establish the extent to which online marketing is relay on customer satisfaction and customer relationship in the society. The research proposes

- a) to evaluate the customer satisfaction and customer relationship in the tier II cities Tiruchirappalli, Madurai and Coimbatore in Tamil Nadu
- b) to analyse the pattern of customer satisfaction and customer relationship while purchasing the products through online marketing
- c) to ascertain the impact customer satisfaction and customer relationship through social media
- d) to study the social media and other online marketing sites that encouraging customer involvement in sharing their online marketing experiences
- e) to identify and evaluate the difficulties faced by the online marketing customers
- f) to offer suitable suggestions on the basis of the findings of the study for improving the customer satisfaction and customer relationship.

### **Limitations of the Study**

The data for the present study were collected through personal interview method. Since the data collected from three tier II cities in Tamil Nadu who had minimum 2 online purchasing experiences, the possibility of data bias exists and hence, the data collected would only be an approximation of actual facts.

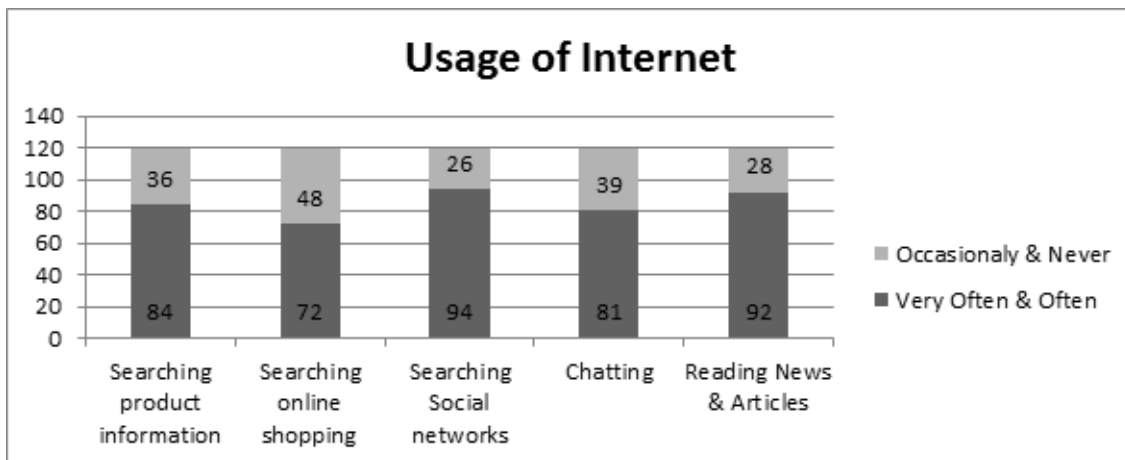


FIGURE: 1 Areas of surfing in internet: (120 Responses)

It is clear that two third of consumers are utilizing internet for searching for product information, online shopping, social networks, chatting and news and article reading. This indicates that majority of them aware and involve in online marketing activities.

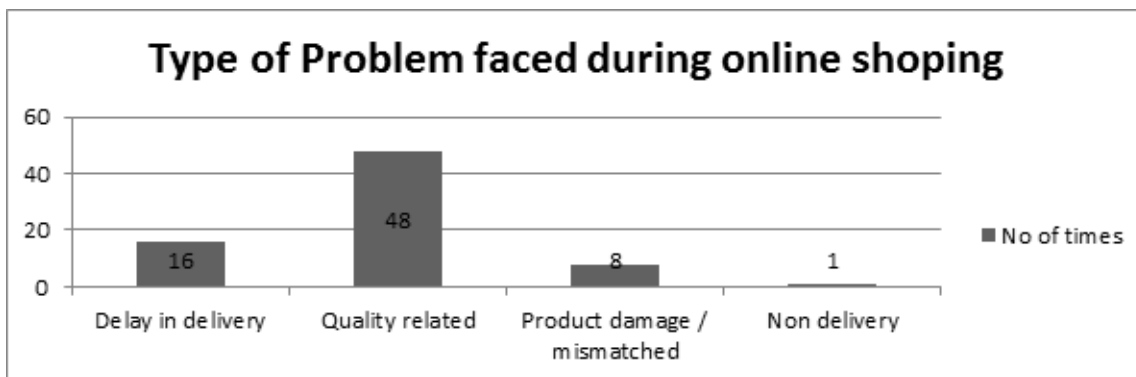


FIGURE: 2 Type of Problem faced during online shopping (120 Responses - out of 720 occasions)

During online shopping of 120 responses @ average six purchase during last two years i.e, about 720 purchases, they faced 48 times Quality related issues, 16 times delay in delivery, 8 times product damage and 1 time non delivery. Strict Quality control and improved packaging / transportation may avoid all these types of problems. Shoppers have to improve their processes to gain the consumers satisfaction. Through satisfied consumers, we can improve their perception in online marketing.

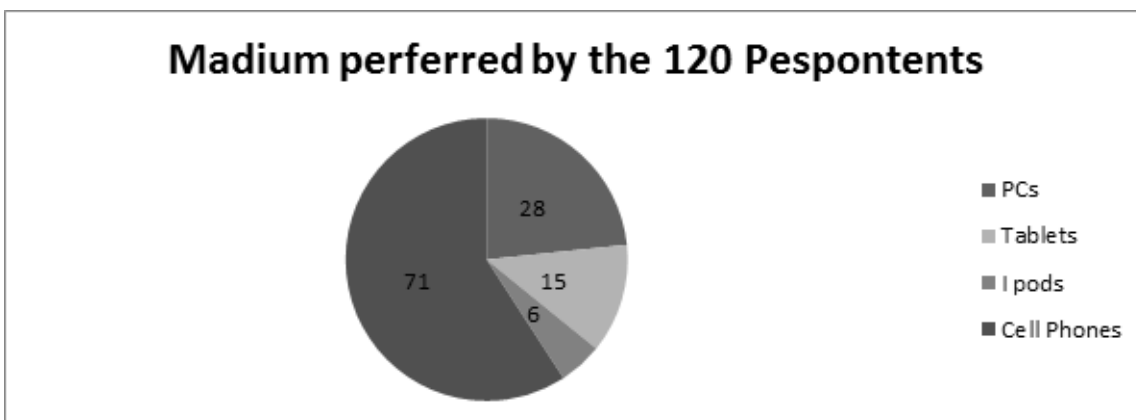


FIGURE: 3 Medium preferred for online shopping (120 Responses)

Out of 120 respondents, 59% of them prefer cell phones, 23% prefer PCs, 12% prefer Tablets and rest of the 6% prefer I pods. This trend indicates most of them used cell phones for online purchasing and this will rise in future. Based on this information shoppers have to develop their own mobile apps to encourage cell phone users to meet their customers need for expanding their business.

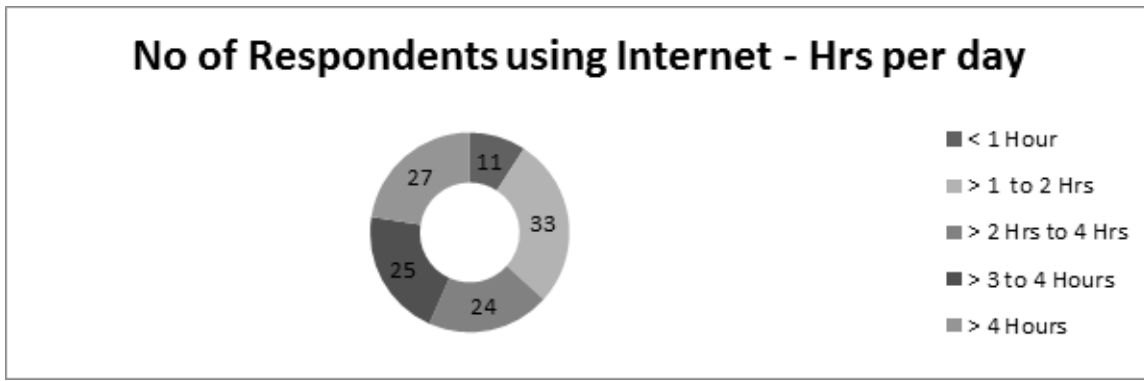


FIGURE: 4 Internet usages (120 Responses)

Usage of internet for more than 2 Hrs is around 63 %, hence most of them well aware of online marketing in these tier two cities. Since the culture of knowing anything in the internet is in the growing trend, now, it is the shoppers’ responsibility to utilize this changing opportunity to do necessary improvement in online marketing and to gain customer satisfaction.



FIGURE: 5 Number of users surfing product information in the net before buying the products through online (120 Responses)

More than 90% of the respondents are surfing the product information in the net before buying. This shows they utilize all the facility in online marketing like comparing the price, alternative available in the market, users review about the product etc..

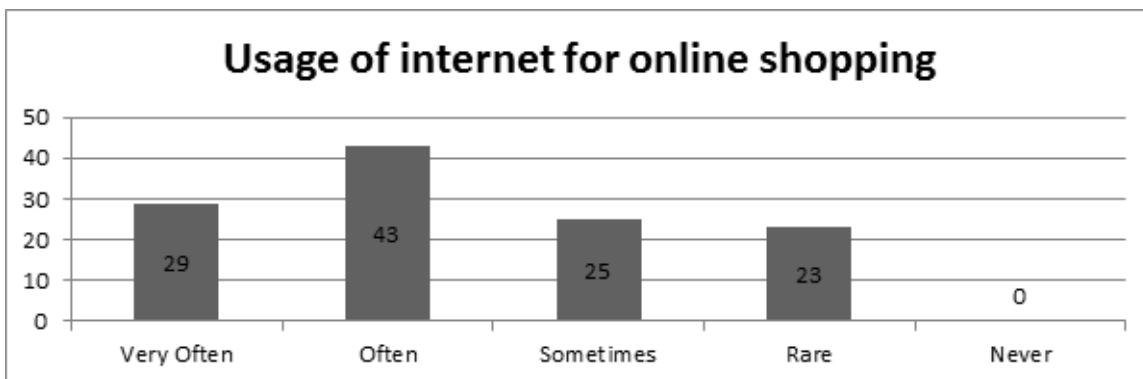


FIGURE: 6 Usage of internet for online shopping (120 Responses)

Statistics indicates that all the respondents uses internet for their online shopping. This positive trend has to be properly utilized by the online marketers to retain their existing customers as well as to attract new customers.

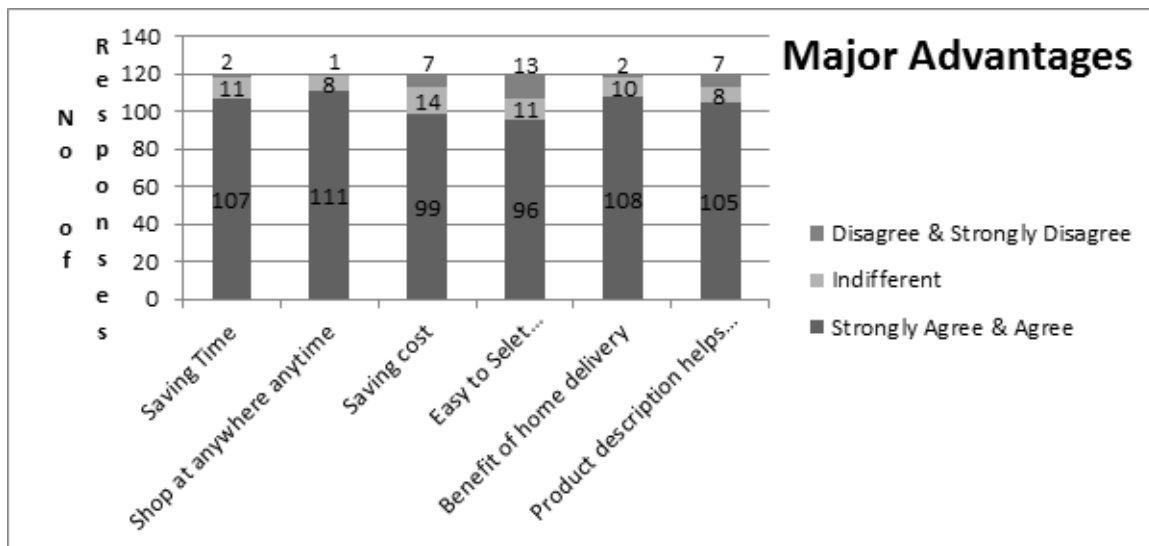


FIGURE: 7 Major advantages (120 Responses)

The response w.r.t major advantages given in the above graph indicates online marketing customers' view. It is a highly positive sign that show customers had obtained major benefits through online marketing and improves customers' satisfaction.

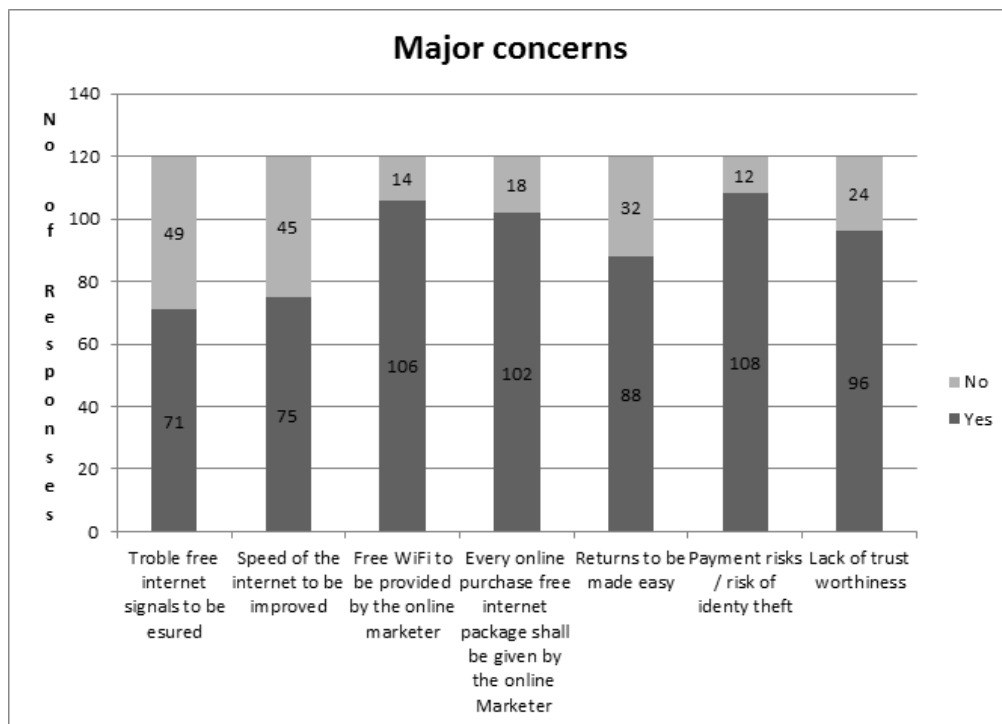


FIGURE: 8 Major concerns (120 Responses)

Majority of online marketing consumers are facing the following problems in product quality, mismatched/damaged product, delay in delivery, payment risks, returns and trouble free internet connections. Marketers have to ensure strict product quality and flawless payment transition system to improve customers' trust. For easy return of faulty products, the companies should make

the arrangement to collect at the customer doorstep. The government digital India programme will improve the internet/Wi-Fi connectivity, speed and reduce the cost of wireless connection.

### Conclusion and Suggestions

Shoppers have realized the benefits of online

purchasing over purchasing from Brick and Mortars. Consumer purchases are mainly based on the cyberspace appearance such as pictures, image, quality information, and video clips of the product, not on the actual experience. It is much easier for customers to find substitutes from competitors on the internet. This feedback forms the basis of market identification and segmentation that enables marketers to better position their products. With the use of the Internet there can be continuous customer support. Services can be made available through interactive e-mail systems on the net. Companies are now using the Internet to build closer relationships with consumers and marketing partners. The growth online marketing depends to a great extent on effective IT security systems for which necessary technological and legal provisions need to be strengthened constantly. Returns of faulty / unsatisfied products are to be made as simple to improve customers' satisfaction. For easy accessibility of mobile users, mobile apps to be developed. Customer relationship and cost effectiveness plays critical role for retaining the existing customers as well as to attract new potential customers to penetrate in this online marketing business module. Online marketing has outsold traditional marketing in recent years and continues to be a high-growth industry. Effective online marketing, leverage consumer data, customer relationship management (CRM) systems and ensures increased customers' satisfaction.

**Ethical Clearance-** Nil

**Source of Funding-** Self

**Conflict of Interest -** Nil

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# A Study on the Issues of Financial Ratio Analysis

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## Abstract

Financial statement analysis consists of applying analytical tools and techniques to money statements in an endeavor to quantify the in operation and money conditions of a firm. The stress of the analysis changes relying upon one's relationship with the corporate. A analyst extending a short, unsecured loan to an organization can examine the firm's income and also the liquidity of the company's assets. A stock capitalist, on the opposite hand, is primarily searching for future growth in income and earnings. Investors generally examine variables which may considerably impact a firm's money structure, sales, earnings production, and dividend policy.

**Keywords:** Ratio Analysis, Finance Operating performance, asset management, profitability ratio.

## Introduction

Having examined the structure and basic interpretation of the record, earnings report, and statement of money flows within the initial 3 components of this series on budget analysis, we tend to come back to the central issue of however the information is employed in investment analysis. This text can take into account money magnitude relation construction and interpretation with a spotlight on ratios classified into in operation performance and liquidity and money risk classes. The money information accustomed illustrate the ratios are taken from the record and financial gain statements developed antecedently.

## Ratio Analysis

Ratios are one in every of the foremost widespread money analysis tools. A magnitude relation expresses a mathematical relationship between 2 things. To be helpful comparisons, however, the 2 values should be connected in how. We've got chosen some wide used ratios that ought to be of interest to investors. Like all ratios, a comparison with different corporations in similar industries is helpful, and a comparison of those ratios for identical firm from amount to amount is vital in pinpointing trends and changes<sup>1</sup>. It's additionally necessary to stay in

mind that these ratios are interconnected and may be examined along instead of severally.

## Operating Performance

Operating performance ratios are sometimes classified into plus management (efficiency) ratios and profit ratios. Plus management ratios examine however well the firm's assets are being employed and managed, whereas profit ratios summarize earnings performance relative to sales or investment<sup>2</sup>. Each of those classes plan to live management's talent and also the company's accomplishments. Asset Management

Total plus turnover measures however well the company's assets have generated sales. Industries take issue dramatically in plus turnover; therefore comparison to corporations in similar industries is crucial. Too high a magnitude relation relative to different corporations could indicate too little assets for future growth and sales generation, whereas too low associate plus turnover figure points to redundant or low productivity assets.

Whenever the extent of a given plus cluster changes considerably throughout the analysis, it's going to facilitate the analysis to reason the common level over the amount. this may be calculated by adding the plus level at the start of the amount to the extent at the tip

of the amount and dividing by 2, or within the case of the associate annual figure, averaging the quarter-end periods.

Inventory turnover is comparable in thought and interpretation to total plus turnover, however examines inventory<sup>3</sup>. We got used price of products sold instead of revenues as a result of price of products sold and inventory reach recorded at price. If victimization printed trade ratios for company comparisons make certain that the figures are computed victimization identical technique. Some services could use sales rather than price of products sold. Inventory turnover approximates the amount of times inventory is employed up and replenished throughout the year<sup>4</sup>. The next magnitude relation indicates that inventory doesn't languish in warehouses or on the shelves. Like total plus turnover, inventory turnover is incredibly trade specific.

The assets turnover tells us what percentage times every amount the corporate collects (turns into cash) its assets. The upper, the turnover, the shorter, the time between everyday sales and money assortment. A decreasing figure over time could be a red flag. Seasonality could have an effect on the magnitude relation if the amount ends at a time of year once assets are usually high. Specialists advocate victimisation a median of the month ending figures to raised gauge the extent over the course of the year and turn out a figure a lot of cherish different corporations. Once averaging the assets, most investors can need to think about quarter-ending figures to calculate average assets<sup>5</sup>.

Average assortment amount converts the assets turnover magnitude relation into a lot of intuitive unit days. The magnitude relation indicates the common range of day's due is outstanding before they're collected. Note that an awfully high range isn't sensible and a awfully low range could purpose to a credit policy that's too restrictive, resulting in lost sales opportunities<sup>6</sup>. Purposeful trade comparisons associated an understanding of credit sales policy of the firm are crucial once examining these figures.

### **Profitability**

Long-run investors purchase shares of an organization with the expectation that the corporate can turn out a growing future stream of money or

earnings even once finance in rising industries like the web sector. Profits purpose to the company's long-run growth and endurance. There are varieties of interconnected ratios that facilitate to live the profit of a firm.

Gross profit margin reflects the firm's basic valuation selections and its material prices. The larger the margin and also the lot of stable the margin over time, the larger the company's expected profit<sup>7</sup>. Trends ought to be closely followed as a result of they often signal changes in market competition.

Operating ratio examines the link between sales and management-controllable prices before interest, taxes, and reserve expenses. Like the profits margin, one is searching for a high, stable margin.

Ratio is that the "bottom line" margin oft quoted for firms. It indicates however well management has been ready to flip revenues into earnings on the market for shareholders. For our example, concerning 4½ cents out of each dollar in sales flows into profits for the shareowner

Enterprise comparisons are important for all of the profitability ratios. Margins vary from industry to industry. A high margin relative to an enterprise norm may point to a business enterprise with a competitive gain over its competitors. The advantage may variety from patent safety to a fairly green operation operating close to capability.

Return on total belongings examines the return generated by using the assets of the company. An excessive go back implies the property is effective and properly-controlled. go back on stockholder's equity (ROE) takes this examination one step similarly and examines the monetary shape of the company and its effect on earnings. Return on stockholder's equity indicates how much the stockholders earned for their funding inside the Organization. The level of debt (economic leverage) on the stability sheet has a massive effect in this ratio. Debt magnifies the impact of profits on ROE at some point of each precise and horrific year. When large variations between return on overall property and ROE exist, an investor should intently have a look at the liquidity and monetary risk ratios<sup>8</sup>.

### **Liquidity**

Liquidity ratios take a look at how without problems



the company should meet its short-term duties, while economic danger ratios take a look at a organization's ability to satisfy all liability duties and the effect of those liabilities at the stability sheet shape.

The modern ratio compares the extent of the maximum liquid assets (contemporary assets) towards that of the shortest maturity liabilities (cutting-edge liabilities). An excessive modern-day ratio indicates high degree of liquidity and less risk of financial trouble. Too excessive a ratio can also factor to needless funding in modern belongings or failure to accumulate receivables or a bloated stock, all negatively affecting profits. Too low a ratio implies illiquidity and the capacity for being unable to satisfy contemporary liabilities and random shocks like moves which can briefly reduce the influx of cash.

The fast ratio, or acid test, is much like the cutting-edge ratio, but it's miles a extra conservative degree. It subtracts stock from the current assets side of the comparisons due to the fact inventory may not usually be quickly converted into coins or may additionally ought to be substantially marked down in charge before it is able to be converted into cash.

### Financial Hazard

Times hobby earned, or hobby coverage ratio, is the traditional degree of a agency's capability to meet its interest payments. Times hobby earned shows how well a company is able to generate income to pay interest. The bigger and more stable the ratio, the less chance of default. Hobby on debt duties need to be paid, regardless of corporation coins flow. Failure to achieve the effects in default, if the lender will no longer restructure the debt responsibilities.

The debt-to-general-assets ratio measures the proportion of assets financed by using all varieties of debt. The higher the percentage and the greater the ability variability of income translates right into a more capacity for default. But, prudent use of debt can increase go back on equity. The debt-to-general-capital ratio is a famous measure of economic leverage, but its name may purpose confusion. Debt for this ratio is composed simplest of long-term debt, no longer general debt<sup>8</sup>. Capital refers to all resources of lengthy-time period financing—long-term debt and stockholder's fairness. This ratio is interpreted within the identical way as the debt-to-general-assets ratio; a high ratio indicates high

chance. However, a low stage might not be an indication of low threat if contemporary liabilities are high.

### Conclusion

Economic ratio evaluation is based on historical monetary statements to look at the beyond and develop an experience for a business enterprise's beauty measured thru factors which include its aggressive role, monetary electricity, and profitability. Information of economic ratios has to provide buyers an experience.

**Ethical Clearance-** Nil

**Source of Funding-** Self

**Conflict of Interest -** Nil

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# Impact of Cross Training on Career Planning and Progression

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## Abstract

This article discusses the effect of cross training of the employees on their career development. Career development is defined as attaining higher position of authority and responsibility. Cross training the employees makes them to learn new things thus helping them to plan the career growth. This training will motivate them to have knowledge on career path and clear planning for the career development. This article says that cross training helps the employee to progress in career path thus influencing the career development.

**Keywords:** Career path, career development, career planning, career progression, cross training

## Introduction

**Career:** Career can be defined as the professional position and successions that an employee experiences. It is the evolutionary sequence in one's profession where the progression depends on the knowledge and skills development.

**Career Development:** Career development of an employee is a continuous and life long process of learning, implementing, managing work and transitions in work towards a defined and planned future. Career development in view of employee is how the individuals plan and manage their career to achieve their goals. It totally depends on the particular individual's characteristics, attitude and career expectation. It is a lifelong process for an employee to achieve his target in his field of interest in his career<sup>1</sup>. Career development is the result of a person's career planning, decision taking ability and understanding the job role concepts etc. In view of Organization, career development is defined as how the management structures the Organization for the career progress of its employees and how they encourage their members for their progress.

In earlier days, Organization was ensuring the career development of its employees and making the provisions to improve their skills. In recent days, employees also understand the need and benefits of career development. They are independently putting their efforts for their career development instead of depending on the Organization's policies. Employees these days prefer the

Organization who offers career development as a basic component in the employee benefits.

### Career Management

Organizations will plan and implement the strategies that enable the employees to achieve their career goals. Human resource management will have the major role in such planning and implementation. The planning of the human resource management should be in line with the needs and goals of the employee and also match the performance and potential of the employees.

## Objectives of Career Planning and Progression

### Objectives of organization:

- To create healthy competition among employees
- To develop the skills of employees
- To attract the talented resources
- To retain the skilled resources with Organization.
- To integrate needs of employee and goals of employer
- To assist the employees with career decisions

### Objectives of employees:

- To set career path in-order to achieve career goals

- To develop skills and knowledge in order to get promotion opportunities
- To stabilize financially by getting promoted
- To enhance career satisfaction

### 1. Perspective of Career Planning

Career development is considered from two perspectives, one is from the view of Organization and the other is from the view of employee.

#### Organization view

Any Organization can achieve the targets and success only with the hard work and efforts of the employees. To motivate the employees towards this success, management should plan and implement development programs for employees<sup>3</sup>. Human resources department should define the goals and strategies towards career development of employees and coordinate between the managers and employees to implement the plans and also helps the employees for their professional growth. This will help the employees to achieve their goals which in turn help the growth of organization.

#### Employee View

It is the responsibility of the employee to plan for his career progress irrespective of the plans of management of the Organization. He should develop his skills and knowledge which will benefit his future and helps to grow vertically in the career. Attitude and goals of the employee will keep on changing from time to time and depends on the work environment and personal ambitions and needs.

### Importance of Career Development in Organizations

Any Organization should give enough importance to career development due to the following reasons.

- Employees will get job satisfaction thus putting more efforts in the job
- Highly talented staff will be attracted towards the Organization
- Employee turnover will come down
- Productivity of the company will increase thus increasing the financial benefits

### 2. Career planning and progression

Planning of the career makes the employee to become aware of his skills and knowledge levels. An employer can motivate the employees by implementing career plans. Thus the planning should be done by both employee and employer.

#### Role of employee in career planning

The employee should take the responsibility to develop his own career irrespective of whether management provides opportunities for development or not. He should assess his own interests and skills and set the goals. To accomplish the goals he should seek for career information resources, skill development opportunities etc. One should define the career plan as per the set goals and move forward and ensure to achieve aspirations. An employee should follow the steps below for efficient career planning.

- **SWOT analysis:** Know the strengths and weaknesses by discussing with supervisors and peers. Find out what skill to learn, higher education to pursue that helps to progress in career.
- **Develop skills:** Determine the skills required for further improvement in the career and develop them.
- **Maintain special competencies:** Employee should keep on updating with current technical specialties.
- **Express the accomplishments:** Document all the achievements and accomplishments of the career that increases the opportunities in career growth.

#### Role of employer in career planning

Employer will also have the responsibility for career planning of the employees. Employer should do frequent appraisals and provide feedback for further improvements, generate career growth options<sup>4</sup>

Providing career oriented training, promotional opportunities to employees are the responsibilities of the employer. This should be planned carefully for a fresh employee who takes up first job. For fresh employees their expectations towards job and realistic picture should match for good motivation. Management should

find out where the employee is lacking and provide sufficient training and motivate him to improve the skills. Employee development activities may not mean the class room training classes or hands on training alone<sup>5</sup>. For motivating and rejuvenating them, employer may arrange for get-togethers and lunch outings etc. This will avoid the boredom in the job and helps the build good relationship between co-employees and seniors.

Periodic job rotation may help the employees to understand the difficulties of each role in the Organization and also provides the realistic picture of strengths and weaknesses towards performing a job.

### **Literature Review**

Dodand Hooley (2015) argues that career guidance offers the employee social and economic benefits though it is concerned with an individual employee. Career guidance and planning is concerned with executing one's career plans and aspirations and exhibiting the potential of individuals.

Workplace management will transform the skills of followers from weak to effective status with developed skills and performing in new ways when supported by effective plans and policies.(Gikopoulou, 2008)

Consistence and effective planning for employee's career yields their development and assures their retainment with same rganization in the long run (Johnson, 2009).

Employees get emotionally attached with the organization when they understand that their management is protecting their positions by making them worthy through efficient planning for their career which encourages their attachment with their work place (Gantasala & Padmakumar, 2011)

The intervention of true management support in the employees' routine activities elevates their courage and polishes their capabilities to bring down the barriers in the way to their career and organizational success (Thessaloniki, 2007)

### **Effect of Cross training on career development:**

#### **Cross training**

The concept of cross training is applicable to any type of industry. Cross training makes the employees to

learn multiple skills with in their domain.

It makes the employees to obtain a competitive advantage by gaining knowledge and skills. They will gain job satisfaction and strive towards continuous development.

It can be planned to any position and to any employee. Technical product companies will expect from their employees to design and develop different type of products irrespective of the subject they have learned hence the technical staff should gain knowledge in all subjects to handle the development of a complete product. Sales oriented offices will train their representative to on variety of roles to handle any type of customers<sup>6</sup>. Production related companies will train their staff to learn all production related activities to work in any position in the shop floor. Employer will offer bonuses and additional benefits to employees who will spare their time to learn additional skills and help the employer during absence of other employee or during heavy production work etc. Employer will be able to counteract the labour shortages, get the advantage of flexible, multi skilled work force, thus increases the business functions like production speed, product quality, efficiency and productivity.

In the view of Organization it can be implemented as the career development strategy for employees as well as the initiative towards the business development. It is advantageous to the employees for their personal career development and it enhances the job security. Well planned cross training will reduce the job stress on the employee and makes them flexible in the work. Cross trained employees are less prone to unemployment and will be paid more than the non-cross trained employees<sup>7</sup>. They will have more chances for promotions to higher positions and for career advancement. This is nothing but developing the career path.

Different types of cross training methods are deployed in Organization such as on the job training, off the job training, unplanned training, leadership training etc. Management will plan the training schedules such that not to affect regular production and enables all the employees to attend the training in turns. This will make the employees enthusiastic to learn a different skill that creates more and more career opportunities inside and outside the Organization.

### Career progression for cross trained employees

An employee who undergoes cross training will be able to deliver multiple skills which makes them more valuable. Cross trained employee's awareness on the roles and functions of Organization will get improved<sup>8</sup>. This makes the employee to progress in his/her career either in the same Organization or to get opportunities' in any other Organization.

Employer will get benefitted as the employee flexibility and scheduling increases. Management will get more knowledgeable employees. Employees will get motivated as their job assignment will keep changing thus avoiding monotony of job.

Job enlargement is another key benefit of cross training which makes the employee to handle the tasks that are at the same level of skill and responsibility. For example training HR executive for processing pay roles who is handling the recruitment This gives the opportunity to the employee to obtain new roles or improved position thus progressing in the career.

### Conclusion

Career management has two components; one is meeting the needs and goals of the Organization and second is the learning potential and enthusiasm of the employee. If all these are synchronized then only goals can be achieved. Cross training better chances of attaining higher positions with more responsibilities thus creating chances for an employee to prove his abilities. An employee can understand the good and bad of all the roles in the Organization after attending cross training and contributes to Organization's goals with increased efficiency. Though the cross training will impact differently at different career stages for different employees, it is useful in developing their career. Through training employees will learn new work skills and their performance will be improved. This will bring new career opportunities to them enabling them to progress in their career.

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# Strategies Influencing Withholding of Women Employees in IT Sector in Chennai, Tamil Nadu

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## Abstract

The increasing rate of employee attrition and the problems the employers and the HR managers face in retaining 'good' and 'performing' employees in the absence of a set of women employee retention strategies are simply compounding in IT companies. Women executives are ambitious and, like men, say they are ready to make some sacrifices in their personal lives if that's what it takes to occupy a top-management job. Many, however, are not sure that the corporate culture will support their rise, apparently with some justification. Although a majority of organizations we studied have tried to implement measures aimed at increasing gender diversity among senior executives, few have achieved notable improvements. This research article throws light on the need and importance of retaining women employees and the strategies enhanced to influence retaining women employees in Chennai IT Hub.

**Keywords:** retention strategies, need and importance, IT hub in chennai

## Introduction

Employee retention refers to the various policies and practices which let the employees stick to an organization for a longer period of time. Every organization invests time and money to groom a new joiner, make him a corporate ready material and bring him at par with the existing employees. The organization is completely at loss when the employees leave their job once they are fully trained. Employee retention takes into account the various measures taken so that an individual stays in an organization for the maximum period of time.

Research says that most of the employees leave an organization out of frustration and constant friction with their superiors or other team members. In some cases low salary, lack of growth prospects and motivation compel an employee to look for a change<sup>1</sup>. The management must try its level best to retain those employees who are really important for the system and are known to be effective contributors. It is the responsibility of the line managers as well as the management to ensure that the employees are satisfied with their roles and responsibilities and the job is offering them a new challenge and learning every day.

## NEED AND IMPORTANCE OF RETAINING FEMALE EMPLOYEES

In a competitive business climate, retaining key employees is vital for the health of the company. But when these key employees are women, many corporations and industries continue to be befuddled as to how to retain this valuable cohort. Indeed, it's surprising how many supposedly modern institutions are caught in a time-warp<sup>2</sup>. Unfair compensation, gender imbalance in senior management positions, inflexible schedules and even active discouragement of female employees continue to plague companies large and small.

The good news is, a few simple steps can vastly improve conditions for female employees. And the benefits of maintaining a women-friendly environment far outweigh the costs. Retaining employees male or female, is just good business sense when you consider both the obvious and hidden costs of a high rate of employee turnover. One of the more obvious steps is fair compensation. It should go without saying that, after years of being treated as second-class employees, women first and foremost want to feel as equally valued as their male counterparts. Fair wages are just a start<sup>3</sup>.

Fair compensation should also include bonuses and benefits. And women don't want to feel like they will be punished for wanting a work/life balance. The lack of a flexible schedule is cited as the number one reason employees leave for other jobs, so companies should ensure they are able to accommodate their workers' need to spend time with family or on other projects. Telecommuting, a compressed work week, collaborative scheduling and self-scheduling can all factor into employee happiness and job satisfaction. Maternity benefits, childcare, and maternity leave should be included in employment packages<sup>4</sup>.

Greater gender balance in the workplace, especially in leadership positions, can pave the way for women to feel that they too can succeed. When women see other women rising within a company, they realize that it is possible for them to rise to senior positions as well.

To this end, the smart employer will consider introducing mentorship programs to encourage high-potential female employees to aspire to senior leadership roles. Women's networks can be critical retention tools as well, particularly for employees at their mid-career level. Retraining and reentry training for women who have temporarily left the workforce are also valuable tools in your retention box. Professional development, career coaching, and grooming for bigger projects and promotions, as well as guidance regarding each woman's career trajectory, are invaluable in retaining female employees.

Executive presence training is one option to consider. <sup>5</sup>A [2016 Forbes article](#) cited a study by the non-profit New York organization Center for Talent Innovation that said being perceived as leadership material is essential to being promoted into leadership positions. The article went on to say that "the 268 senior executives surveyed said 'executive presence' counts for 26% of what it takes to get promoted". Women who are trained to develop an executive-type persona in terms of gravitas – that is, confidence, poise under pressure and decisiveness – as well as communication and appearance become more confident and are better able to command a room, thereby clearing a path to high-stakes and high-visibility positions. By utilizing some or all of these ideas, companies can benefit from a healthier and more balanced work environment. It just makes sense.

## Statement of the Problem

Women at work are not equally distributed within the economy. Though the enrolment and literacy level have been showing very positive sign of growth trend, the drop out level after getting employed and not able to sustain employment has been a matter of concern. This drop out effect is because of the cultural and social barrier faced by even educated women today. This unequal distribution of women workforce in IT industry makes the study crucial. In spite of young skilled and talented women entering the work immediately after graduating, organizations find it difficult to retain them. Reason usually being marriage, maternity or simply someone in family decided. More than one-third (36 percent) of working Indian women quit their jobs to deal with family issues<sup>6</sup>. Software companies provide cab facilities, work from home options, flexible time schedule, extended maternity leaves, and enhanced training programs to reconnect to work. Despite providing many supportive programs it is difficult for the women to sustain in the industry. More often women returning from maternity leaves are treated as less productive. Very few women fight their way to come up in the career graph majority just quit. Keeping women on staff requires more than just making them happy so the company works on their families, too.

The troubled economy may feel like an emotional roller coaster. "Layoffs" and "budget cuts" have become bywords in the workplace, and the result is increased fear, uncertainty, and higher levels of stress. Since job and workplace stress increase in times of economic crisis, it is important to learn new and better ways of coping with the pressure<sup>7</sup>. The increasing number of drop outs, the need for double income at home and the growing concern on health issues, corporate professional suicides, heart attacks at young age, increase in divorce rates, and safety of Chennai women now make this study more important than ever. These entire problems induced the researcher to find a solution through this study. This paper will explain about the how those strategies influence the women to stay in their organization and also lighten the impact of existing retention practices of women employees.

## Objectives of the Study

1. To understand the existing strategies for retaining women employees in IT industry

2. To identify the organizational challenges faced by the women compelling them to discontinue career

### **STRATEGIES FOR RETAINING WOMEN EMPLOYEES**

- **Work should never become monotonous and must offer a new learning each day.** An employee should be able to upgrade his skills and enhance his knowledge at the workplace. Employees leave the organization whenever there are no chances of further growth. An individual must be made to do something which really excites him and most importantly matches his background. The employees must be asked to accomplish the tasks in the most innovative way for them to enjoy their work. No one should be asked to do anything out of compulsion. The team leader must not force anyone to work. Let them accept assignments willingly. The moment work becomes a burden for the employees, they look for a change.
- **Every individual should enjoy privacy at the workplace.** The superiors must ensure that no employee interferes in each other's work. Team members sitting at adjacent desks should not overhear their colleague's conversation or check any confidential documents. These things lead to severe demotivation and prompt an individual to look for a change. Discussion is important but one should not irritate anyone. The team manager should also not make his team member's life hell. Just give them deadlines and ask them to complete the assignments within the desired time frame. Motivate them to deliver their best but don't be after their life. Remember everyone is mature enough to understand that work comes first, and everything later.
- **Every employee should be treated as one irrespective of his designation.** Sexual harassment is against the law and is a strict no no at the workplace. The male workers should respect their female counterparts and make them feel comfortable. Don't ask any female employee to stay back late. Leg pulling, back stabbing, lewd remarks must be avoided at the organization to retain the employees.
- **The management must formulate employee friendly policies.** The employees must be allowed to take one or two leaves in a month so that they

get time to rejuvenate. Don't call the employees on weekends. Let them enjoy. The human resource department must take the initiative to celebrate birthdays of employees at the workplace. This way people come closer, make friends, develop trust and are thus reluctant to go for a change. Major festivals should also be celebrated at the organization for employees to get attached to the organization.

- **Incentives, cash prizes, trophies, perks should be given to deserving employees to motivate them to perform up to the mark every time.** The salaries of the high potential employees must be appraised from time to time as monetary dissatisfaction is one of the major reasons for employees quitting their jobs. The hard work of the workers must be appreciated. The slow learners must not be criticized but should be inspired to gear up for the next time.
- **The performers must be made to participate in the decision making process.** They should have a say in the major strategies of the organization for them to feel important and trust the management.

#### **Have more women leaders**

The first thing that gives a woman confidence at her workplace is having women leaders to look up to. This also indicates that the company offers them an environment conducive to scale the corporate ladder. It would be more beneficial if women leaders took on the role of mentors in mentorship programmes that are already at work in certain companies.

#### **Empower Female Employees to Shape Company Culture**

Startup land has become famous for offering a fraternity-like atmosphere: free beer, video games, and personalized hoodies. While it's not fair to say women don't like these perks, tech companies should include women on the teams that are shaping company culture. Expanding the activities beyond those evoking college dorm rooms will help attract talented women who don't feel connected to those traditions.

Finally, it should go without saying that the best way to attract female talent is to offer competitive wages and excellent benefits that will support them in their life choices regardless of if they decide to have children or not. While the grand gesture of Facebook and Apple will surely help their recruitment efforts, our corporate



culture as a whole needs to focus on making small, but important, everyday changes and sticking with them

### Conclusion

The study throws light through valuable suggestion to increase the female employees' retention in the organization. This study can help the management to find the weaker parts of the female employee feels towards the existing organization retention strategies and also helps in converting those weaker part in to stronger by providing the optimum suggestions or solutions.

**Ethical Clearance-** Nil

**Source of Funding-** Self

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# Forcing Gender Issues and Challenges Affecting Women Employees to Continue their Career in IT Industry

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## Abstract

Despite the major advancements women have made in becoming a significant part of the workforce, they are still facing important career development issues. Although many women achieve lower and middle management positions, they seem to hit the “glass ceiling” in many organizations and are denied the most senior levels of upper management. The reasons are multi-dimensional; some women lack the confidence to apply for senior positions; some lack the necessary education or training; and others find themselves excluded from the top positions because of systemic gender bias that exists in some companies. There are plenty of statistics tracking the percentage of women in the workforce, their qualifications and their salaries. But the data doesn’t show us the whole picture. It doesn’t assess how women feel, how they fare in their day-to-day business, the challenges they encounter. And that is why the research embarked on a global task, asking more than 9,500 women across the G20 to identify the top five issues faced at work especially in IT industry.

**Keywords:** *Women Retention, Issues and Challenges, Career Advancement, Gender Discrimination, Strategies to Overcome.*

## Introduction

Despite progress in employment gender equality, men continue to substantially outnumber women in terms of employment in the tech industry. Many analysts attribute the gender disparity in technical fields to the fact that women study science, technology, engineering and mathematics (STEM) at a lower rate than men do. Some experts suggest that cultural expectations also influence the gender divide causing women to feel pressured to pursue careers in other industries<sup>1</sup>.

Regardless of having equal or superior skills to their male counterparts, women often feel like societal pressure and cultural norms work against them while seeking employment and advancement in tech careers. Many companies have taken a proactive approach toward gender bias in tech employment by adopting inclusive and collaborative policies that mandate equal treatment for men and women. However, the following three challenges still exist in many settings, but women in IT can overcome them as they pursue a fulfilling and successful career.

## 1. Inequality and Discrimination

Statistics indicate that women working in IT positions report gender inequality at a higher rate than the overall average among employed women. Networking opportunities and promotions go to men in tech careers at a higher rate than to women<sup>2</sup>. Company events and trade gatherings often provide settings where male tech workers exhibit sexist attitudes and behaviours toward their female colleagues. Meanwhile, employees in the work environment often question whether a woman has the ability to address and resolve technical issues.

Gender discrimination, though illegal, still exists in the job market. Interviewers ask questions about marital and parental status to three-quarters of female applicants. Even when not directly quizzed about their family status, a stunning forty-percent of all women feel like they must carefully guard details about their family during job interviews. When women (or any employee) feel like outsiders in the workplace because of their unique qualities or differences (e.g., gender, race/ethnicity, nationality, age, religion, sexual orientation), they feel excluded. Exclusion comes at a great cost to

organizations in the form of lowered job satisfaction, reduced work effort, diminished employee voice, and greater intention to leave. Building an inclusive work place means creating a culture that fully engages and supports *all* employees<sup>3</sup>.

Women who experience discrimination and inequality in the workplace should talk about the issue openly and report it to their supervisor. The company's responsibility will, then, be to address the issue properly. To prevent such situations from occurring again, business owners need to educate their personnel about gender discrimination and teach them how to recognize and deal with it.

Moreover, business owners and managers who have a healthy attitude toward women in the workplace should set an example for the entire company by behaving in ways that respect all workers and treat everyone working in IT fairly, regardless of gender<sup>4</sup>. Such behavior will also respectfully treat all employees that become mothers and make them feel comfortable and secure while taking leave. Similarly, employers need to adopt flexible scheduling so working mothers don't feel as though they must neglect their responsibilities to keep their job.

## 2. Not Fitting In

Women in male-dominated fields such as IT often lack self-confidence and suffer from feelings of inferiority. In a workplace where the great majority of employees are male, women often feel as they don't fit in. A drastic number of approximately 60 percent of women working in tech report sexual harassment<sup>5</sup>. Although such problems can exist in fields with a higher degree of gender equality, the problem seems worse in IT. Female tech workers have a higher incidence of sexual harassment in IT because fewer targets exist in that profession. The fact that one-third of women IT workers feel unsafe at work illustrates the severity of the problem. This is a serious issue and women should never hesitate to report it to their supervisors.

Additionally, not having a college degree in engineering or computer science can also lead to a workplace atmosphere where women feel as though they don't fit in. Some women can also experience difficulty staying up-to-date with the latest trends in technology, leading to a skill gap that adds to the challenges they face<sup>6</sup>. Still, women can do IT jobs just as well as men

can, as long as they make an effort to develop and maintain their proficiency in required skills.

Luckily, the IT industry usually operates as a meritocracy where employees who deliver consistent results receive favourable treatment regardless of their gender or background. Women can overcome the obstacles they face while working in IT by letting their performance speak for them. Although the strategy doesn't eradicate gender-based prejudice and discrimination, it allows women to achieve upward mobility.

## 3. Lack of Support and Understanding

Female IT employees often report feeling as though they don't have the full support of their co-workers. They also feel a lack of support at home in cases where their family members and friends still embrace cultural biases regarding women in the workforce. Attitudes about the role of women at home often prevent female IT workers from achieving a healthy work-life balance. Also, new mothers often cut short their paid maternity leave because they feel as though they will lose their job or promotion because of their absence.

Handling inequality and discrimination in the workplace is hard on its own, but handling it without any support for the chosen career makes things even harder. Working on improving the quality of family communication can go a long way in making sure that every female IT worker's family member understands that their job in the IT industry is important to them.

## 4. Flexible Work Arrangements and equal pay

Flexible work arrangements (FWAs)<sup>7</sup> define how, where, and when employees' work, allowing them to best manage their career and personal priorities. Once seen as an employee benefit or an accommodation for caregivers (primarily women), flexible work arrangements are now an effective tool for organizations to attract top talent as well as a cost-savings measure to reduce turnover, productivity, and absenteeism.

**Equal Pay - it's 2018, and women *still* make less than men.** Women around the world continue to face a wage gap. In fact, women on average will need to work more than 70 additional days each year just to catch up to the earnings of men. Our research shows that even after taking into account prior experience, time since degree, job level, industry, and global region,

women MBA graduates were paid \$4,600 less than men in their first job after graduation<sup>8</sup>.

### 5. Children and career

Almost half of the women polled are optimistic about the prospects of having a child and a career. Women in emerging countries led by Brazil – where maternity laws are generous and family ties are close – are the most confident. By contrast, women in some of the richest countries – Germany, the UK and France – are least confident and feel having a family might wreck their careers.

According to the Denver Women's Commission, even though most women work outside the home, they are still the primary caregivers for their young children as well as elderly or infirm relatives<sup>9</sup>. Consequently, many women can only pursue their careers on a part-time basis, resulting in fewer promotion opportunities. Unlike their male colleagues, women consider the ages of their children and the amount of time they have available before they decide to pursue a career path.

### What Else Can Be Done?

IT companies need to recognize and admit to the problem of gender inequality in their IT workforce. They need to diligently transform their corporate culture into one that respects all employees, regardless of gender, and make discrimination and harassment socially unacceptable.

Employers need to create and enforce policies that protect women when they become victims of sexual harassment and discrimination. However, they also need to go beyond forced compliance to fully eliminate gender-related IT employment issues.

Technology exists for men and women and so does IT employment. As companies and families work to erase gender-based prejudices, more women will aspire a career in the tech industry. Girls need positive male and female role models so that they will never consider their gender as a negative attribute.

### Conclusion

Women can overcome gender-based challenges in IT right now by focusing on their skills and staying current with industry trends. Still, cultural norms need to change in employment, family and educational settings to permanently eliminate the problem of gender discrimination, so every woman can feel confident,

supported and safe as they pursue their dreams. As an atmosphere of equality permeates the workplace culture, women will feel confident because they know their skills and performance determines their success rather than their gender and college degree.

**Ethical Clearance-** Nil

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# Emerging Trends of IT Industry Policies for Ensuring Women Employee Retention

“New-Fangled Women Friendly Policies Which Foster Gender Neutral Workplace”

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## Abstract

Today, behaviour of women employees has changed the environment of the private organization. Young women employees always ready to switch over whenever she dissatisfy with any reason in the job. Retention strategy is a powerful recruitment tool. Private organizational issues matters as lost knowledge and training time. HR managers should identify the needs of the women employee and then devises the retention strategies. As different individuals have different priorities does not fit one strategy. HR professionals face the vital challenge to retain talented women employees. Retention strategies are fall into four categories -job enrichment, salary, working conditions and education, addressing these issues this article demands a specialized approach that emerge new fangled women friendly policies which foster gender neutral workplace in developing retention strategies.

**Key words:** retention strategies for female employees, scope, trends and policies

## Introduction

The fast developing knowledge economy coupled with the information technology during the last two decades has totally changed the complexion of our business and employment relations. The globalized economy and the labour market have further added new dimensions to this phenomenon. India has taken advantage of this growing trend entering the IT sector of economy and industry<sup>1</sup>. Though the Indian is fast responding and taking the challenge head on and competing effectively in the new IT dominated global market the industrialist-employer in the IT industry are facing another challenge, namely, finding suitable people to recruit to the jobs being generated by them. When and where they are able to find people who can meet their expectations, they are facing the new challenge that this is coming their way in the form of retaining the people working with them. In fact, recruitment and retention are two sides of the same coin. Economically and financially employee retention, of late has acquired greater significance.<sup>2</sup> It is much more costly and time consuming to find the right replacements. Resultantly the employee retention has turned out to be a critical challenge to the employers.

They have become very sensitive to the problem of employee retention. Researchers also are seized of the situation and getting involved in this challenge.

Researchers have found that workplace culture and women's personal character traits play major roles in retention. So what are the things that make a difference? Women prefer workplaces that are collaborative rather than hierarchical, explains Heather Metcalf, director of research and analysis at the Association for Women in Science<sup>3</sup>. And they are more apt to stay in work environments that allow for creativity and flexibility, she says. Conversely, women are fleeing companies that encourage employees to practically live at work, she says. While 71 percent of women with young children work outside the home, according to the Pew Research Center, women still shoulder more responsibility for child care and elder care than men. So living at the office to show they are committed to their jobs is not an option. “Creating workplaces that have a lot of flexibility, that allow for people to work in a way that fits best with them, boosts creativity and job satisfaction,” Metcalf says, and these are the settings where women stay and thrive. No matter what type of organization women work for, large or small, public or private, their relationships



with their immediate bosses are critical to whether they feel engaged and content<sup>4</sup>. The ideal supervisor is committed to his or her subordinates' advancement and development, assigns stretch projects, and provides necessary support and feedback to help them be successful, Bilimoria says<sup>5</sup>. And workplaces that employ women in higher levels are more apt to retain women at the lower levels.

### **Objectives of the Study**

1. To identify the emerging trends and policies for retaining women employees in IT industry
2. To identify the scope of ensuring women retention in IT industry
3. To suggest new policies that are women friendly and that will foster gender neutral work place

### **Scope of the Study**

Keeping in view the critical problem the organizations in the IT industry have been facing ever since the IT industry came into existence in India to retain their performing employees at different levels, this study seeks to understand the different strategies of different organizations for retaining their employees and examine whether those strategies have any universal base and comparison with the experiences of high-tech organizations or organizations depending on the knowledge workers or professional employees and if so what are these common employee retention strategies being in practice in different organizations in the IT industry in Chennai.

The scope of this study is confined to IT industry in Chennai. The study throws light through valuable suggestion to increase the female employees' retention in the organization. This study can help the management to find the weaker parts of the female employee feels towards the existing organization retention strategies and also helps in converting those weaker part in to stronger by providing the optimum suggestions or solutions. This study is a clear guide for the solution seeker about the factors which induced women employees to stay back in the same organization. Special attention has been shown in this research about their empowerment in the society economically as well as professionally. Career development is an existing trend to be stay in their organization and how these factors induced them; all those answers will be make this research unique and an

find an enhanced approach towards balancing gender at workplace.

## **EMERGING TRENDS FOR RETAINING WOMEN EMPLOYEES**

### **More Women Leaders**

The first thing that gives a woman confidence at her workplace is having women leaders to look up to<sup>6</sup>. This also indicates that the company offers them an environment conducive to scale the corporate ladder. It would be more beneficial if women leaders took on the role of mentors in mentorship programmes that are already at work in certain companies.

### **Sexism-Free Work Culture**

Every workplace must offer a safe and secure environment for employees that help them grow personally and professionally. But it is a sad reality that this is not always true in India. Some of the biggest companies here lack sexual harassment cells and policies against discrimination at the workplace. Create a culture that does away with sexism at work by educating your employees about 'unconscious biases' and 'benevolent sexism'.

### **Pay men and women equally**

When you hire talented women, understand that they put in the same amount of hard work and time as the men and acknowledge that with equal pay. Offer them equal opportunities and trust them with responsibilities similar to what their male counterparts are given to foster increased confidence and professional growth.

### **Transparent Performance Evaluation Policy**

Make it clear to all employees how they are going to be evaluated and about the requirements to be met to make career advancements. It is commonly seen that most organisations promote men on potential and women only on measurable and proven performance. Check your talent management systems and do away with such biases.

### **Flexible Work Schedules**

Many Indian companies already offer flexible schedules to their employees, but most often they turn out to be only the freedom to choose their shifts. True flexibility means allowing your employees to adjust their

work schedules to maintain a healthy work-life balance without being penalised. <sup>7</sup>As long as they turn in their work on time and are producing results, their physical absence from office shouldn't be a concern. Having flexible schedules end up in happier, more satisfied and extremely productive employees. Good intentions, alone, are not enough to make women employees want to work for your company. Treat them well, provide them opportunities for professional development and create a culture that values their talents and respects them as individuals.

### **Paternity Leave**

Reputation being known as a company that promotes gender equality will go a long way in attracting top female talent. And offering a generous paternity leave policy is one of the most effective ways to demonstrate a commitment to women and working families. While paternity leave is designed for men, it ultimately benefits working mothers and children. Furthermore, since most states don't require it by law, implementing paternity leave shows that an employer is willing to go above and beyond to promote equality and inclusion.

### **Empower Female Employees to Shape Company Culture**

Startup land has become famous for offering a fraternity-like atmosphere: free beer, video games, and personalized goodies<sup>8</sup>. While it's not fair to say women don't like these perks, tech companies should include women on the teams that are shaping company culture. Expanding the activities beyond those evoking college dorm rooms will help attract talented women who don't feel connected to those traditions.

Finally, it should go without saying that the best way to attract female talent is to offer competitive wages and excellent benefits that will support them in their life choices regardless of if they decide to have children or not. While the grand gesture of Face book and Apple will surely help their recruitment efforts, our corporate culture as a whole needs to focus on making small, but important, everyday changes and sticking with them

### **Career Development Program**

Every individual is worried about her career. You can provide them conditional assistance for certain courses which are beneficial from your business point of view. Conditional assistance means the company will

bear the expenses only if she gets an aggregate of certain percentage of marks. And entrance to that course should be on the basis of a Test and the number of seats to be limited. For getting admitted to such program, you can propose them to sign a bond with the company, like they cannot leave the company for 2 years or something after the successful completion of the course.

### **Timely increments**

Timely Increments in salary makes talented employees to stick to the organisation for long time. Many researchers have found that the salary and increments were the core reasons behind leaving of employees to other organisations and competitor organisations attracts talent by showing sole monetary benefits, indeed most of the talent is getting attracted for this reason. It is universal fact and one has to accept that the monetary benefit is the core reason for an employee decision-making on retention in the organization

### **Conclusion**

In a competitive business climate, retaining key employees is vital for the health of the company. But when these key employees are women, many corporations and industries continue to be befuddled as to how to retain this valuable cohort. Indeed, it's surprising how many supposedly modern institutions are caught in a time-warp. Unfair compensation, gender imbalance in senior management positions, inflexible schedules and even active discouragement of female employees continue to plague companies large and small. The good news is, above few simple strategies can vastly improve conditions for female employees. Women who are trained to develop an executive-type persona in terms of gravitas that is, confidence, poise under pressure and decisiveness – as well as communication and appearance become more confident and are better able to command a room, thereby clearing a path to high-stakes and high-visibility positions. By utilizing some or all of these ideas, companies can benefit from a healthier and more balanced work environment. It just makes sense.

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